

U.S. INFORMATION SERVICES MARKETS, 1983-1988

CROSS-INDUSTRY MARKETS - VOL. II

INPUT



# About INPUT

INPUT provides planning information, analysis, and recommendations to managers and executives in the information processing industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions. Continuing services are provided to users and vendors of computers, communications, and office products and services.

The company carries out continuous and in-depth research. Working closely with clients on important issues, INPUT's staff interpret the research data and make recommendations and innovative

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## OFFICES

### Headquarters

1943 Landings Drive  
Mountain View, CA 94043  
(415) 960-3990  
Telex 171407

### Detroit

220 E. Huron  
Suite 209  
Ann Arbor, MI 48104  
(313) 971-0667

### New York

Park 80 Plaza West-1  
Saddle Brook, NJ 07662  
(201) 368-9471  
Telex 134630

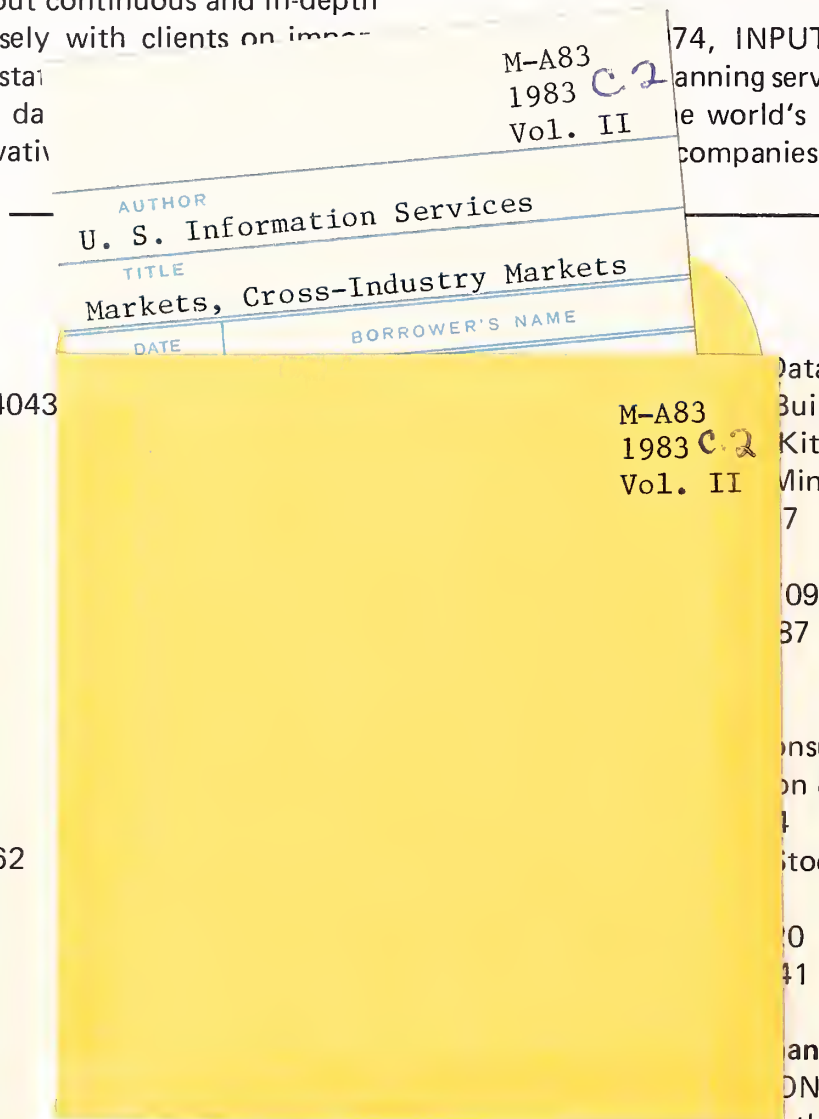
### United Kingdom

INPUT, Ltd.  
Airwork House  
35 Piccadilly  
London, W1V 9PB  
England  
01-439-8985  
Telex 23116

Via Sopperga 30  
Italy  
Milan 284-2850  
Telex 310352

Am Elisabethenbrunnen 1  
D-6380 Bad Homburg  
West Germany  
Telex 418094

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U.S. INFORMATION SERVICES MARKETS,  
1983 - 1988  
VOLUME II  
CROSS-INDUSTRY MARKETS

DECEMBER 1983





**U.S. INFORMATION SERVICES MARKETS, 1983-1988**  
**VOLUME II - CROSS-INDUSTRY MARKETS**

**CONTENTS**

	<u>Page</u>
I INTRODUCTION.....	1
A. Purpose of this Report	1
B. Scope of the Reports	3
C. Methodology	6
D. Report Organization for Volume II: Cross-Industry Markets	7
II EXECUTIVE SUMMARY .....	9
A. U.S. Information Services Markets: 1983-1988 (Cross-Industry)	10
B. Tools Lead Cross-Industry Growth	12
C. RCS Opportunities Show Wide Variance	14
D. Applications Software Exploding on Many Fronts	16
E. Accounting: Improve Data Access	18
F. Planning and Analysis: Improve Interaction	20
G. Systems Software: An End-User Driven Market	22
H. Value-added Networks: More "Value," More Competition	24
I. PCs and Integration - a Common Competitive Edge	26
J. PCs and Integration - a Common Competitive Edge (continued)	28
K. Summary: Provide an Integrated Business Strategy to Selected Markets	30
III ENVIRONMENTAL DEVELOPMENTS .....	33
A. The End-User Computing Environment	33
B. Opportunities in End-User Computing	43
IV MARKET ANALYSIS .....	55
A. Market Overview	55
1. Information Services Market Overview	55
a. Processing Services	57
b. Software Products	59
c. Professional Services	64
d. Integrated Systems	67
2. Cross-Industry Overview	67

	<u>Page</u>
B. Accounting Market	79
1. Market Size and Growth	79
2. Issues and Trends	81
3. Competitive Analysis	82
4. Recommendations	86
C. Education and Training	89
1. Market Size and Growth	89
2. Issues, Trends, and Competitive Analysis	89
a. Live Instruction	89
b. Video Instruction	92
c. Computer-assisted Instruction	92
D. The Engineering and Scientific Market	94
1. Market Size and Growth	94
2. Dominant Product Trends	97
3. Dominant Support Trends	98
4. Dominant Pricing Trends	99
5. Reasons for Using an Outside Service	99
6. Factors in Influencing Conversion to In-House Services	100
7. Software Portability	100
8. E&S Market Needs	101
9. Recommendations	101
E. Human Resources Market	102
1. Market Size and Growth	102
2. Issues and Trends	106
3. Competition Analysis	108
4. Recommendations	111
F. On-Line Data Base Market	112
1. Market Size and Growth	112
2. Issues and Trends	115
3. Recommendations	115
G. Planning and Analysis Markets	116
1. Market Size and Growth	116
2. Issues and Trends	118
3. Competition Analysis	119
4. Opportunities and Recommendations	120
H. Systems Software Markets	120
1. Market Size and Growth	120
2. Issues, Trends, and Opportunities	122
I. Utility Processing	134
J. Value-added Networks	140
1. Market Size and Growth	140
2. Issues, Trends, and Competitive Developments	141
a. CSC Infonet Network	143
b. GEISCO MARK-NET	144
c. ITT	145
d. Tymnet	146
e. Telenet	147
f. Pricing Trends	148
3. Recommendations	149



	<u>Page</u>
APPENDIX A: DEFINITIONS.....	151
A. Revenue	151
B. Service Modes	152
C. Other Considerations	157
APPENDIX B: DATA BASE.....	163
APPENDIX C: INFORMATION SERVICES VENDOR FINANCIAL WATCH .....	175
APPENDIX D: RELATED INPUT REPORTS.....	199



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**U.S. INFORMATION SERVICES MARKETS, 1983 - 1988**  
**VOLUME II - CROSS-INDUSTRY MARKETS**

**EXHIBITS**

			<u>Page</u>
II	-1	U.S. Information Services Markets: 1983-1988 (Cross-Industry)	11
	-2	Tools Lead Cross-Industry Growth	13
	-3	RCS Opportunities Show Wide Variance	15
	-4	Applications Software Exploding on Many Fronts	17
	-5	Accounting: Improve Data Access	19
	-6	Planning and Analysis: Combine Power and Simplicity	21
	-7	Systems Software: Multiple End-User-related Opportunities	23
	-8	Value-added Networks: Changes on Multiple Fronts	25
	-9	PCs and Integration: A Common Competitive Edge	27
	-10	PCs and Integration: A Common Competitive Edge (continued)	29
	-11	Summary - Provide an Integrated Business Strategy to Selected Markets	31
III	-1	Fourth-Generation Languages	34
	-2	Installed MIPS after Fourth-Generation Language Installation	36
	-3	Cost Impact of Fourth-Generation Language Use at Different Staffing Levels	37
	-4	Projected Fourth-Generation Language-related Increases 1983 to 1985	38
	-5	Expected Growth in Number of Information Center Users, by Type of User: 1983 to 1985	39
	-6	Advantages and Disadvantages of the Information Center Compared to Commercial Timesharing	41
	-7	Fourth-Generation Languages - the Emerging Link	42
	-8	Contrasts in Traditional and Fourth-Generation Language System Development	44
	-9	Characteristics of Computing Alternatives from the User's Viewpoint	45
	-10	Information Center Software Portfolio	48
	-11	Software Integration Levels	49
	-12	Personal Computer Standardization Eras	50
	-13	The PC User Self-Support Curve	52
	-14	Contrasting Personal Computer Software Support to Conventional System Software Support	53

	<u>Page</u>
IV    -1    Total U.S. Information Services Market Forecast Ranked by 1988 Size	56
-2    Processing Services Markets Ranked by 1988 Size	58
-3    Largest Processing Services Vendors by Noncaptive U.S. Revenue	60
-4    Software Products Markets Ranked by 1988 Size	61
-5    Largest Software Products Vendors by Noncaptive U.S. Revenue	62
-6    Personal Computer Applications Software Markets, 1983-1988	63
-7    Professional Services Markets Ranked by 1988 Size	65
-8    Largest Professional Services Vendors by Noncaptive U.S. Revenue	66
-9    Integrated Systems Markets Ranked by 1988 Size	68
-10    Largest Integrated Systems Vendors by Noncaptive U.S. Revenue	69
-11    Information Services Market, 1983-1988	70
-12    Cross-Industry Markets Ranked by 1988 Size	72
-13    Total Cross-Industry Applications Markets by Delivery Mode - Ranked by 1988 Size	73
-14    Remote Computing Services Cross-Industry Applications Markets - Ranked by 1988 Size	75
-15    Mainframe/Mini Application Software Cross-Industry Markets - Ranked by 1988 Size	76
-16    Micro Applications Software Cross-Industry Markets - Ranked by 1988 Size	77
-17    Software Products Market Structure	78
-18    Cross-Industry Applications Markets Forecast - Accounting Applications, 1983-1988	80
-19    Accounting-related Packages Available for IBM Computers	83
-20    Vendors of Top-selling Cross-Industry Packages	85
-21    Progression of Accounting Needs	88
-22    Cross Industry Applications Markets Forecast - Education and Training Sector, 1983-1988	90
-23    Education and Training Market Growth by Delivery Mode - 1983-1988	91
-24    Cross-Industry Applications Markets Forecast - Engineering and Scientific Sector, 1983-1988	95
-25    Human Resource Applications	103
-26    Cross-Industry Applications Markets Forecast - Human Resources Sector, 1983-1988	105
-27    Features Offered by Twenty-five Vendors of Human Resource Systems	109
-28    Relative Importance of Decision Factors for Human Resource Information Systems	113
-29    On-Line Data Base Markets Ranked by 1988 Size	114



		<u>Page</u>
-30	Planning and Analysis Cross-Industry Applications Markets Ranked by 1988 Size	117
-31	Systems Software Products Market Structure	121
-32	Systems Software Markets Ranked by 1988 Size	123
-33	Historic System Software Product Line Relationships	125
-34	Future Productive Software Relationships	129
-35	Organizational Responsibility by Selected Software Product Areas	132
-36	Software Company Shapes	133
A	-1 Industry Sector Definitions	158
B	-1 Total Information Services Cross Industry Application Market Forecast by Delivery Mode, 1983-1988	163
	-2 Planning and Analysis Application Market Forecast by Delivery Mode, 1983-1988	164
	-3 Accounting Application Market Forecast by Delivery Mode, 1983-1988	165
	-4 Human Resources Application Market Forecast by Delivery Mode, 1983-1988	166
	-5 Engineering/Scientific Application Market Forecast by Delivery Mode, 1983-1988	167
	-6 Education and Training Application Market Forecast by Delivery Mode, 1983-1988	168
	-7 Information Services Cross Industry Application Market Forecast by Application, 1983-1988	169
	-8 Remote Computing Services Cross Industry Application Market Forecast by Application, 1983-1988	170
	-9 Cross Industry Application Market Forecast by Application, 1983-1988	171
	-10 Application Software Cross Industry Application Market Forecast by Application, 1983-1988	172
	-11 On-Line Data Base/Value Added Networks Total Market Forecast, 1983-1988	173





## I INTRODUCTION



## I INTRODUCTION

- This report is produced as one of a series of reports in INPUT's Information Services Industry Program (ISIP).
- INPUT conducts ongoing research into the information services industry, studying a variety of issues and trends that affect industry participants.

### A. PURPOSE OF THIS REPORT

- The information services industry is now firmly entrenched as a star performer in the U.S. economy. Practically nonexistent 25 years ago, user expenditures of \$31 billion in 1983 will explode to \$81 billion by 1988, a 21% average annual growth rate (AAGR).
- What originally began as an ill-organized scattering of a few small, under-financed startup firms is now composed of over 6,000 organizations. These firms are becoming increasingly interlinked via joint development and marketing arrangements. Many of the world's largest and most technically sophisticated firms are now either participating in this industry or are eyeing it with increased interest.
- However, all is not riches and fame. The information services industry is being enveloped in a whirlwind of change that is making previously successful



strategies obsolete at an alarming rate. Technology is accelerating. The basic business economics are changing. Competitors are getting stronger and buyers are becoming more discerning.

- This volume is volume two of a two-volume set that profiles, analyzes, and forecasts the changing character of the information services markets in the U.S. economy. The purpose of these two reports is to present a comprehensive overview of the industry in 1983 and to provide forecasts for market size and growth over the next five years.
- Throughout these two volumes emphasis is placed on identifying market trends, analyzing their driving forces (including competitive, technological, and economic factors), and examining their impact on market size and growth through 1988.
- Specific challenges and opportunities for information services vendors are noted, as are hazards and areas of low growth or high risk. Where appropriate, specific recommendations related to business strategy are presented.
- These reports are designed to assist vendor executives in:
  - Identifying new market and product opportunities.
  - Assessing risk.
  - Allocating scarce resources.
  - Obtaining insights into market-related development that can affect business profitability.
- These reports are also designed to help information services industry investors and observers to:

- Understand the major trends affecting market health.
- Identify emerging opportunities at an early stage.

## **B. SCOPE OF THE REPORTS**

- These two reports are organized as follows:
  - Volume I, Industry-Specific Markets, addresses markets that focus on the unique requirements of 14 major industry sectors in the U.S. economy. Industries analyzed are:
    - . Discrete Manufacturing.
    - . Education.
    - . Federal Government.
    - . Insurance.
    - . Medical.
    - . Other.
    - . Process Manufacturing.
    - . Retail Distribution.
    - . Services.
    - . State and Local Government.

- .       Transportation.
- .       Utilities.
- .       Wholesale Distribution.
- Volume II, Cross-Industry Markets, addresses markets that have requirements that are common across multiple-industry segments. Markets analyzed in this report are:
  - .       Accounting.
  - .       Education and Training.
  - .       Engineering and Scientific.
  - .       Human Resources.
  - .       On-Line Data Bases.
  - .       Planning and Analysis.
  - .       Systems Software.
  - .       Utility Processing.
  - .       Value-Added Networks.
  - .       Other.
- Forecasts in these reports cover the following delivery modes:

- Processing Services.
  - . Remote Computing Services.
  - . Batch Processing.
  - . Processing Facilities Management.
- Software Products.
  - . Applications Software.
    - Mainframe/Mini Computer Software.
    - Personal Computer Software.
  - . Systems Software.
    - Applications Development Tools.
    - Systems Control.
    - Data Center Management.
- Professional Services.
- Integrated (turnkey) Systems.
- Industry analyses are supplemented by demographic profiles of each industry based on the most current U.S. government data.
- The information services industry forecasts developed here by INPUT are for U.S. user expenditures for noncaptive business (i.e., business derived from a firm's parent or affiliated organization is excluded).



## C. METHODOLOGY

- The process of forecasting is a continuous one.
- This year's report represents the seventh year INPUT has studied the information services industry in its entirety.
- Two fundamental and complementary approaches are used to analyze the industry.
  - The first is a "bottom up" approach. Thousands of interviews are conducted with buyers of information services in each of the industries analyzed.
  - Target interviews are typically with division managers or higher, usually holding purchase or budget authority for at least one type of information service. Both end-user as well as information systems professional managers are interviewed.
- On the other side, INPUT conducts an annual census of revenues and growth for all information services industry vendors with annual revenues greater than \$10 million. Stratified random sampling techniques are employed to estimate the size and change in that portion of the industry represented by smaller firms.
- At the convergence of these two processes INPUT researchers analyze industry size, composition, change, and direction to generate the forecasts included in these two volumes.
- All forecast numbers presented are in current dollars (i.e., inflation is taken into account). Significant assumptions include:

- GNP over the next five-year period will grow at 3% per year.
- Inflation is assumed to show a 6% annual increase over the forecast period.

#### **D. REPORT ORGANIZATION FOR VOLUME II: CROSS-INDUSTRY MARKETS**

- Chapter two provides an executive summary of key observations, forecasts, and conclusions from the volume. The summary is provided in a presentation format complete with script, thus enabling readers to quickly and easily communicate these findings to appropriate groups.
- Chapter three discusses important environmental trends that are affecting the entire marketplace. Special emphasis is placed on an analysis of the end-user computing revolution.
- Chapter four provides an analysis of each of the cross-industry markets.
- Appendix A contains a definition of terms and parameters used to structure the research.
- Appendix B contains a comprehensive data base of statistical market forecasts from which the textual references and exhibits are drawn. The data base is arranged in two sections:
  - The first section shows market size and growth by mode of delivery.
  - The second section displays the same data but arranged according to application.

- Though data in the data base are presented at the single-digit level of precision, this is the result of the calculation procedure used. In the text, forecasts are rounded to 10 millions so as not to imply a level of precision that does not exist.
- Appendix C contains a reconciliation of this year's forecasts with last year's.
- Appendix D contains a list of related reports.
- INPUT always welcomes comments, inquiries, and suggestions relating to our report content and structure.

## II EXECUTIVE SUMMARY





## II EXECUTIVE SUMMARY

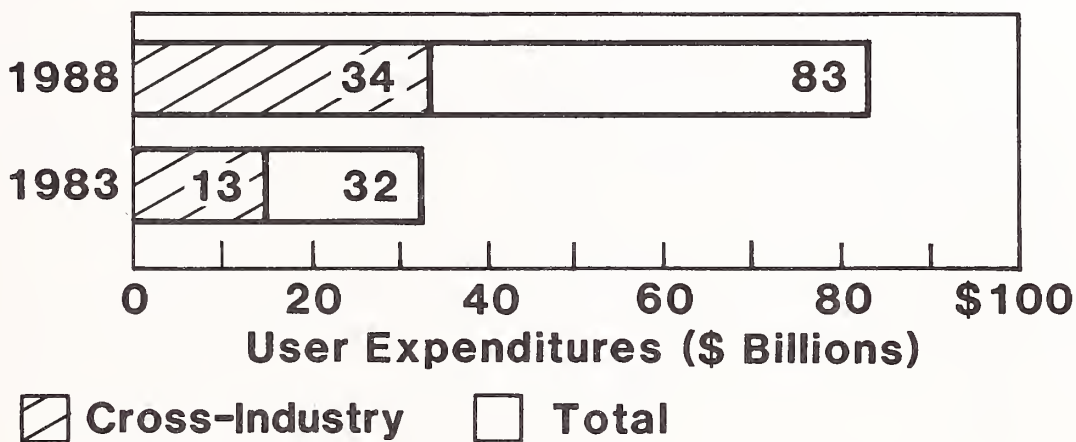
- This executive summary is designed in a presentation format in order to:
  - Help the busy reader quickly review key research findings.
  - Provide a ready-to-go executive presentation, complete with script, to facilitate group communications.
- The key points of the entire report are summarized in Exhibits II-I through II-III. On the left-hand page facing each exhibit is a script explaining its contents.

## A. U.S. INFORMATION SERVICES MARKETS: 1983-1988 (CROSS-INDUSTRY)

- This report is produced by INPUT as part of the Information Services Industry Program (ISIP). It is volume two of a two-volume annual report series. The other volume addresses industry-specific markets.
- The information services market is one of the healthiest and fastest growing sectors of the U.S. economy. From a base of \$32 billion in 1983, information services will grow to \$83 billion by 1988, a 21% average annual growth rate (AAGR).
- Cross-industry applications address market needs common across multiple-industry segments. Cross-industry applications are a healthy sector of the total market, accounting for \$13 billion in 1983 (42% of the market) and growing to \$34 billion in 1988 (43% of the market). The five-year AAGR is 21%.
- INPUT urges vendors to approach cross-industry markets with caution. Enormous opportunities exist. However, there is much variation in the attractiveness of individual sectors.
- The scope of this report includes:
  - Five-year market forecasts covering six delivery modes and 10 cross-industry market sectors. Altogether a total of 47 individual segment forecasts are provided.
  - In addition, for the key cross-industry market sectors, a discussion is provided in terms of major issues, key trends, and competitive activities. Where appropriate, specific market opportunities are identified and recommendations provided.

## U.S. INFORMATION SERVICES MARKETS: 1983-1988 (Cross-Industry)

- **Cross-Industry Share Increasing to 40%**



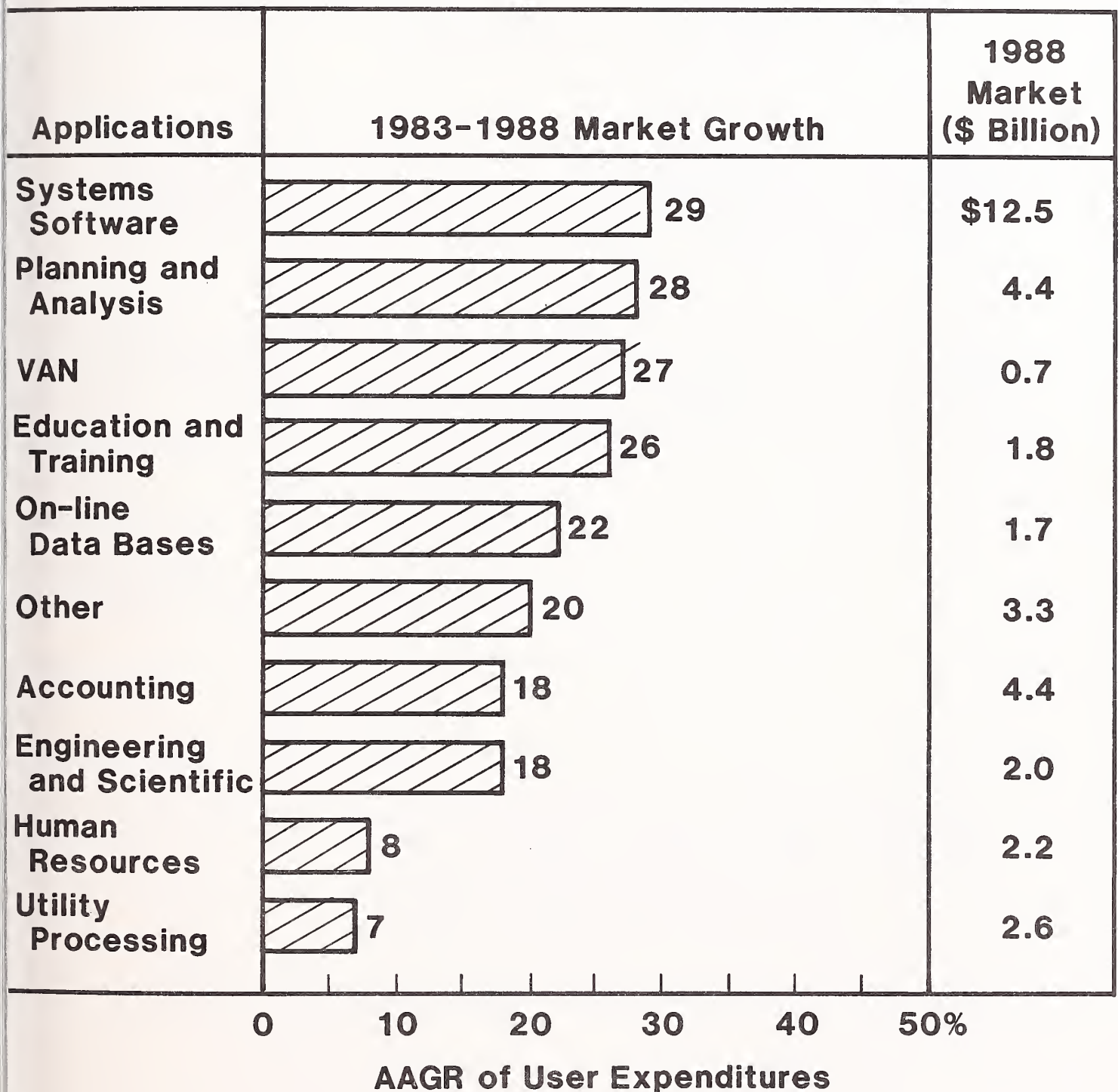
- **Much Variation Within Sectors**
- **Report Scope**
  - Five-year Market Forecasts
  - 6 Modes, 10 Sectors, 47 Segments
  - Issues, Trends, Competition
  - Recommendations



## B. TOOLS LEAD CROSS-INDUSTRY GROWTH

- Cross-industry-related services that are primarily tools to help the user accomplish other tasks are growing faster than cross-industry services that are primarily oriented toward transaction processing. For example:
  - Systems software leads all other sectors with a 29% average annual growth rate and a \$12.5 billion market size by 1988.
  - Planning and analysis applications, the second largest and second fastest growing sector, are tools primarily for managerial and professional personnel. These applications typically rely upon data produced elsewhere.
  - Value-added networks, with a 27% AAGR, are communications-based services that are vehicles through which various applications are realized.
  - Education and training are not ends unto themselves, but are productivity tools for the purpose of preparing people for other tasks.
- It should be noted that value-added networks and on-line data bases also have important industry-specific sectors. When both cross-industry and industry-specific sectors are combined, the five-year average annual growth rate for value-added networks is 38%; for on-line data bases it is 23%.
- The four leading high-growth cross-industry sectors are benefiting from the revolutionary interest in end-user computing. Millions of new computer users are emerging with an insatiable appetite for applications development tools, effective end-user-oriented analysis systems, links to distant mainframes, and cost-effective training.
- Many of these cross-industry sectors are well served by more than one delivery mode. Opportunities vary widely between different delivery modes.

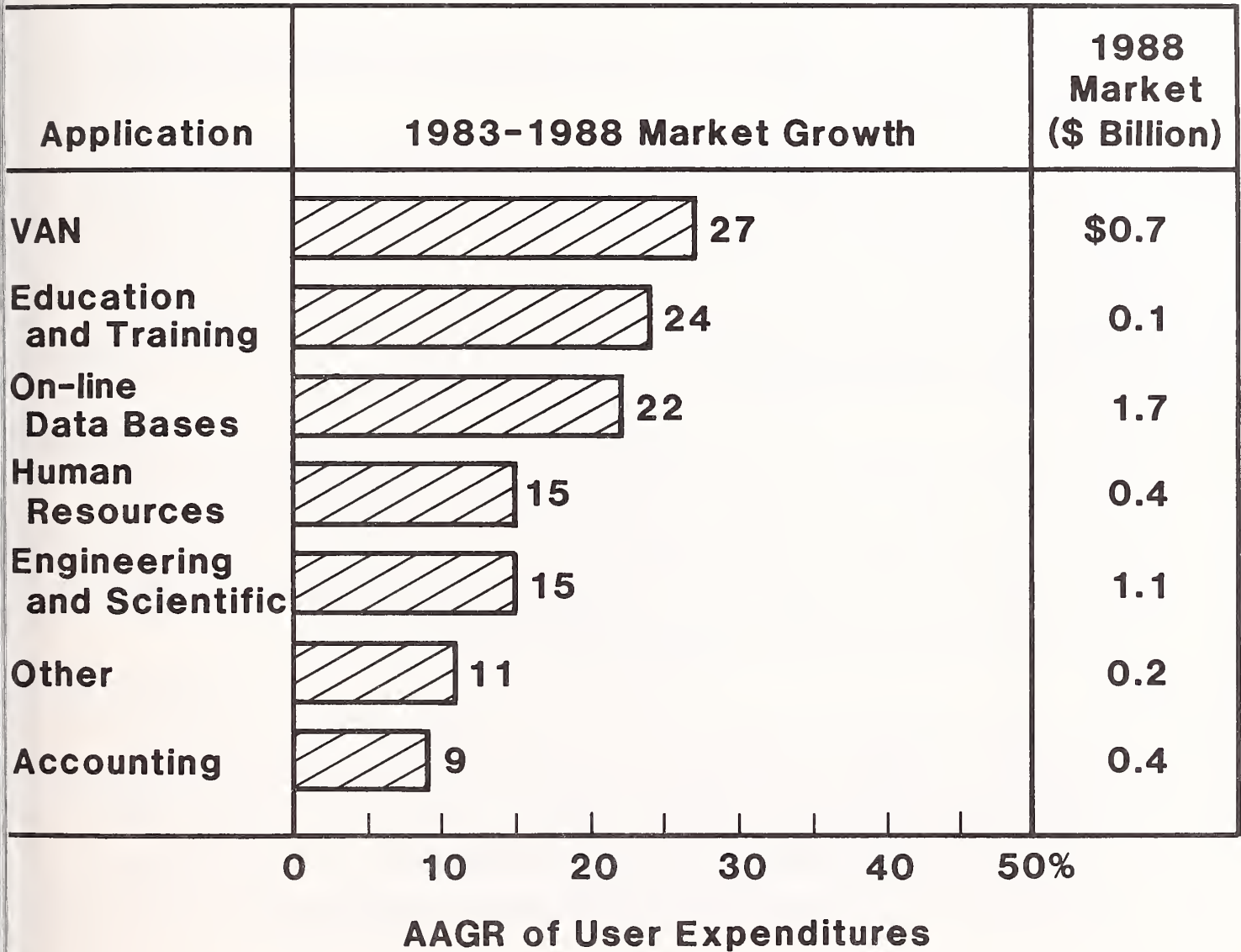
# TOOLS LEAD CROSS-INDUSTRY GROWTH



### C. RCS OPPORTUNITIES SHOW WIDE VARIANCE

- Two out of three of the fastest growing RCS cross-industry sectors have no competition from other delivery modes. Both value-added networks (27% AAGR) and on-line data bases (22% AAGR) are intrinsically tied to RCS. Both are major opportunities that leverage the explosion in intelligent workstations and the interest in PC-to-mainframe links.
- Sectors showing the slowest growth are engineering and scientific (15% AAGR) and accounting (9% AAGR). Both are encountering significant competition from alternative delivery modes such as PCs and applications software product vendors.
- The largest cross-industry RCS market will be on-line data bases, with \$1.7 billion in user expenditures by 1988. This sector will be discussed in more detail later in the executive summary.

## RCS OPPORTUNITIES SHOW WIDE VARIANCE





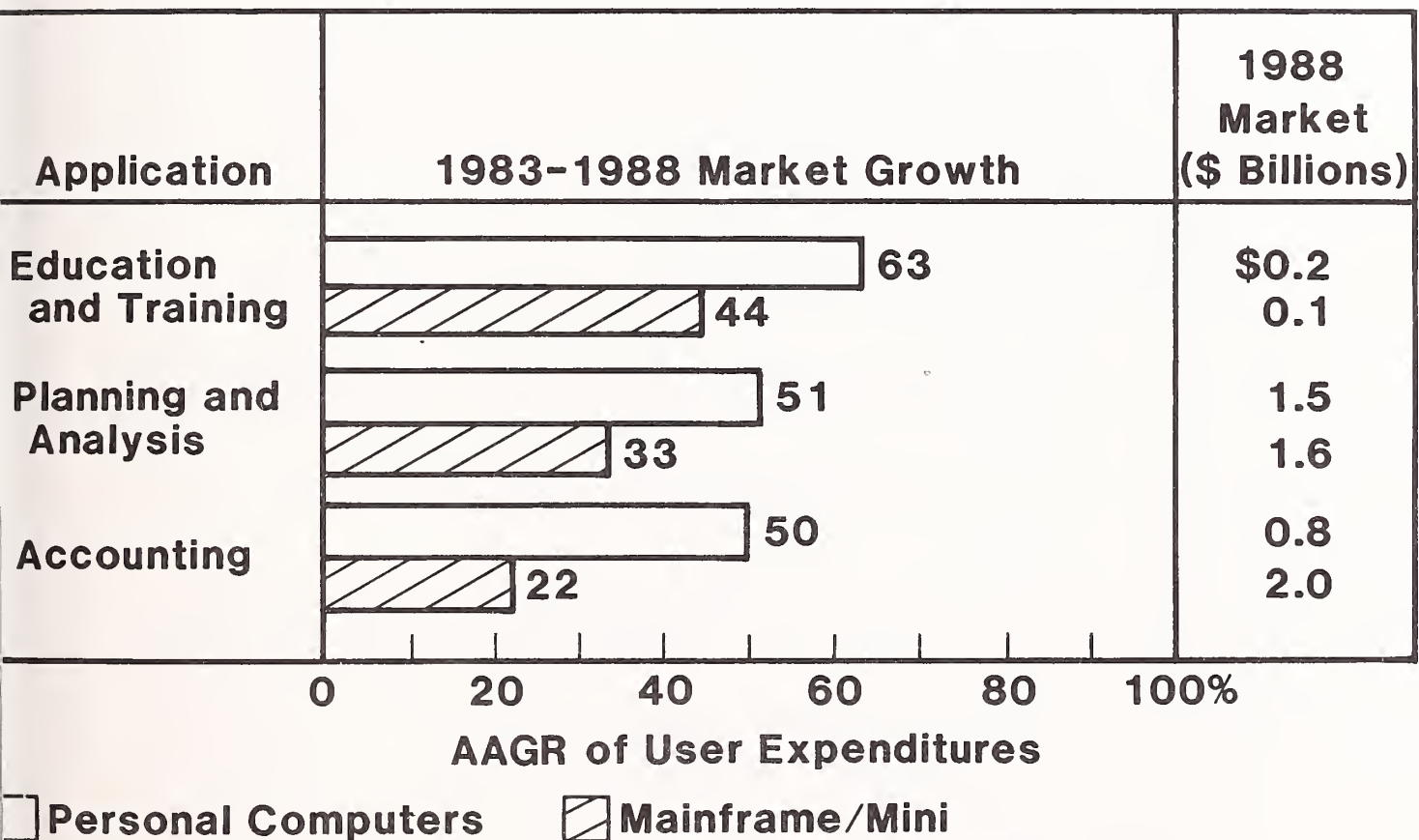
#### D. APPLICATIONS SOFTWARE EXPLODING ON MANY FRONTS

- Applications software products are the fastest growing cross-industry delivery mode. From \$2.2 billion in 1983, this sector will grow at a 30% AAGR to a \$8.2 billion by 1988. Both mainframe/minicomputer and personal-computer software products will do well during this timeframe.
- The hottest markets in terms of growth are education and training, planning/analysis, and accounting.
- PC software for education and training will accelerate with a 63% AAGR, while mainframe/mini offerings will post a very respectable 44%. The explosion in end-user computing activities is creating a very large demand for educational approaches that help computer neophytes realize the productivity gains they have been promised.
- Planning and analysis will do especially well, with a total market size of \$3.1 billion by 1988. PC software will lead the growth with a 51% AAGR. Mainframe/mini software will show a 33% AAGR. The sophistication of planning and analysis will increase as the computerized tools become simultaneously more powerful and easier to use for nonprogrammers.
- Accounting applications are the third fastest growing market. Due to the increasing emphasis upon integrated applications, the accounting applications market benefits from the increased demand for better data to support planning and analysis. Conversely, planning and analysis is further stimulated by the introduction of more effectively integrated accounting systems.
- In order to reach these high-growth markets quickly, vendors are discovering that established distribution channels are a crucial resource. The need for effective channels has helped stimulate the movement toward more joint-marketing arrangements between vendors.



## APPLICATIONS SOFTWARE EXPLODING ON MANY FRONTS

- \$8.2 Billion Market by 1988
- Fastest Growth (Cross-Industry)





- Distribution Channel Importance Increasing

## E. ACCOUNTING: IMPROVE DATA ACCESS

- Accounting, a classic cross-industry application, will grow from a 1983 base of \$1.9 billion to \$4.4 billion by 1988, an 18% AAGR.
- Delivery mode performance varies widely. Whereas PC and mainframe/mini software products will grow at 50% and 22% AAGR respectively, the RCS component will only grow at 9%, while the batch mode will be 2% (a net loss in real terms). The relatively poorer performance from nonsoftware product modes is traceable to factors like the lower cost and increasing power of in-house hardware alternatives and the increasing cost of telecommunications.
- The demand for accounting systems is being stimulated by organization disruptions caused by deregulation and economic fluctuations. New, better, more sophisticated ways are needed to monitor and control the financial aspects of firms undergoing great change.
- Another market stimulant is the increasing obsolescence of in-place systems. Many automated accounting systems were designed years ago without benefit of today's hardware and software technology advances. As computer systems become increasingly a weapon for maintaining a company's competitive edge, out-of-date systems will impose unacceptable penalties.
- The evolution of major suppliers toward stronger business financial strategies is an important competitive development. McCormack & Dodge, for example, was acquired by Dun & Bradstreet. Software International became a unit of GEISCO. The trend toward better financed competitors will continue for the next several years.
- Vendors wishing to compete in this marketplace are urged to focus on capabilities that enhance the accessibility of the data created by the accounting system. Product strategies should include more product integration, on-line facilities, PC-to-mainframe links, fourth-generation languages, and DBMS.

## ACCOUNTING: IMPROVE DATA ACCESS

- **\$4.4 Billion in 1988 (18% AAGR)**
- **Fastest Growing Modes**
  - **PC Software**  **50%**
  - **Mainframe/Mini Software**  **22%**

1983-1988 AAGR
- **Stimulated by Economic Restructuring**
- **Replacement Opportunities**
- **Well-Financed Competition**
- **Emphasize Data Access via Integration, On-line, PC Links**

## F. PLANNING AND ANALYSIS: IMPROVE INTERACTION

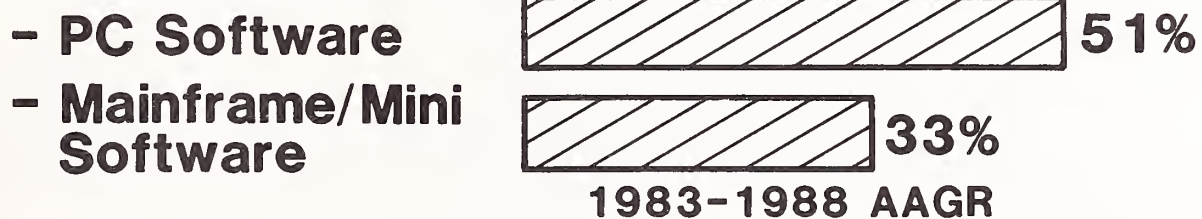
- Planning and analysis is the second largest and second fastest growing of the cross-industry markets. A 28% AAGR will drive the 1983 market of \$1.3 billion to \$4.4 billion in 1988.
- The planning and analysis sector is one of the chief beneficiaries of the end-user computing revolution. The over 10 million managers and professionals using computing for the first time are primarily interested in analysis-oriented systems that directly relate to their areas of responsibility.
- PC software will experience a spectacular 51% AAGR to become a \$1.5 billion market by 1988. This growth is being fueled by the rapid pace of innovation emerging from both hardware and software vendors. Many of the new announcements, such as Windows from Microsoft, VisiOn from Visicorp, and the 3270 PC from IBM, strive to make analysis-oriented computing easier and more attractive.
- Mainframe/mini software will be a \$1.6 billion market by 1988, an AAGR of 33% from the 1983 base of \$0.4 billion. The increasing integration of transaction-oriented systems, such as accounting systems, with planning and analysis systems is helping to propel this market sector.
- Vendors are urged to extend their competitive edge via integration and joint ventures. Creative product strategies should be developed that integrate transaction systems with analysis capabilities. In addition, the activities of leading-edge PC systems software vendors should be closely followed. New capabilities should be identified early so that they may be incorporated into product design.
- The popular PC analysis systems (e.g., Lotus 1-2-3, etc.) should be analyzed for possible tie-ins to current or future products. Joint ventures in product and marketing areas should be aggressively investigated in order to reach targeted markets sooner.



## PLANNING AND ANALYSIS: COMBINE POWER AND SIMPLICITY

- \$4.4 Billion in 1988 (28% AAGR)

- Fastest Growing Modes



- Key Beneficiary of End-user Computing Revolution
- Enhance Competitive Edge
  - Integration With:
    - Transaction Systems
    - New PC Systems Software
    - Popular PC Analysis Systems
  - Joint Ventures

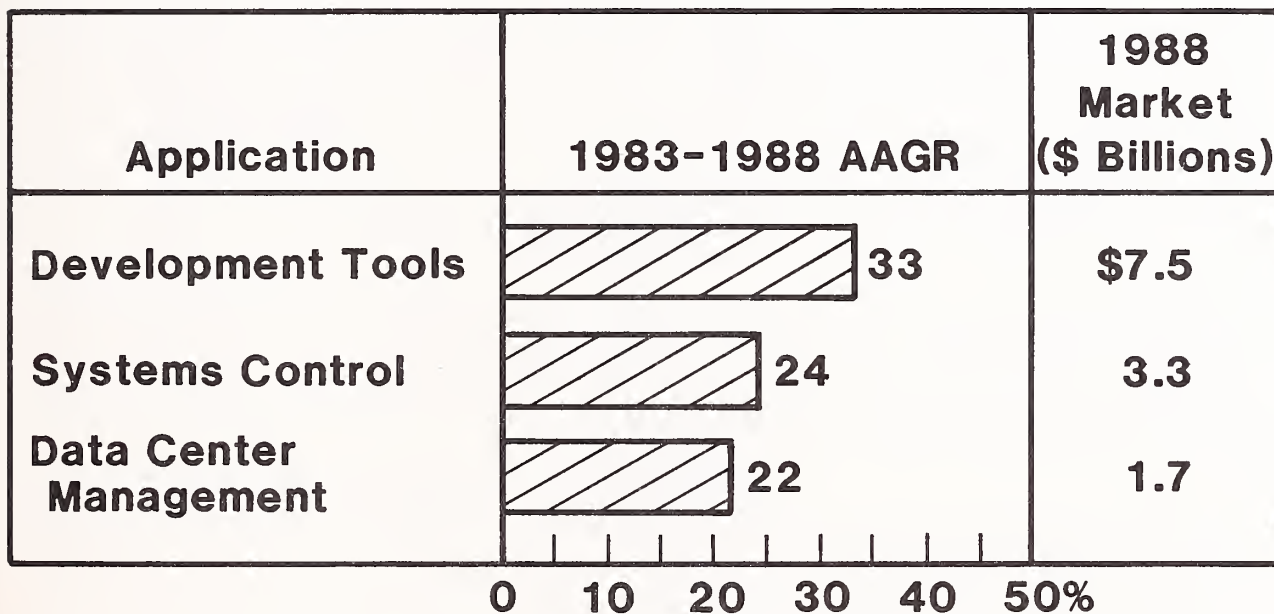


## G. SYSTEMS SOFTWARE: AN END-USER DRIVEN MARKET

- Systems software will grow from a 1983 base of \$3.5 billion to \$12.4 billion by 1988, an average annual growth rate of 29%.
- Those portions of the market most closely tied to end users will be growing the fastest.
  - Applications development tools are growing at 33% AAGR and are the largest in terms of market size. The popularity of DBMS-oriented integrated applications, combined with the popularity of tools such as fourth-generation languages, is helping to drive this market.
  - Systems control software, will emerge as a \$3.3 billion market by 1988. This is a result of a 24% AAGR from a 1983 base of \$1.1 billion.
  - Data center management software will grow at 22% AAGR reaching \$1.7 billion by 1988. The evolution toward increasingly distributed networks will result in more computer locations, but will produce a reduction in the average size of an installation.
- Systems software opportunities that INPUT considers especially attractive during the next five years include:
  - Support of new technology for advanced office functions, such as optical storage devices and backend data base management machines.
  - Development of "expert" and fourth-generation languages that incorporate advances in artificial intelligence and dramatically improve the user's interface.
  - Development of network control software which increases the effectiveness of telecommunications systems that will be the ubiquitous "glue" that makes distributing processing a reality.

# SYSTEMS SOFTWARE: MULTIPLE END-USER-RELATED OPPORTUNITIES

- **\$12.4 Billion Market by 1988 (29%)**



- **Opportunities**
  - Advanced Office Systems Support
  - Specialized Operating Systems
  - Expert Languages
  - Network Control

## H. VALUE-ADDED NETWORKS: MORE "VALUE," MORE COMPETITION

- The total value-added network market will explode from \$260 million in 1983 to \$1.3 billion in 1988, a 38% AAGR. The industry-specific sector, which is only 24% of today's market, will increase an impressive 66% annually to become \$630 million by 1988.
- Competition heated up as several RCS vendors spun off networks during 1983. GE announced MARK-NET, CSC unbundled a portion of its Infonet service, and IT&T entered the market with a five-city offering. GE and CSC's approach is especially interesting as they have elected to offer "one-stop" service that includes professional services, mainframes, and software (either custom or packaged). Their strategy helps to better differentiate them from many existing suppliers who offer only communications.
- Another interesting competitive development was the decision by some of the "second tier" vendors to become resellers for Tymnet and Telenet. Meanwhile, Tymnet and Telenet both expanded and enhanced their services.
- AT&T's recent tariff filings will likely lead to substantial price increases for VAN services. It is INPUT's belief, however, that VAN vendors will be able to recapture these increases in operating expenses by increasing prices.
- On the surface VAN services appear to fit well with RCS strategies. However, while the market will be strong during the next five years, it is important to consider that this market has its own set of complications, including the involvement of information systems decision makers, rather than end users, to whom RCS vendors are most accustomed. Other obstacles include lack of user loyalty and frequent price negotiation with large customers.

## **VALUE-ADDED NETWORKS: CHANGES ON MULTIPLE FRONTS**

- **Tripling to \$1.3 Billion by 1988 (38% AAGR)**
- **New RCS Spin-Offs with Expanded Service**
- **Second-Tier Resellers**
- **New Tariff Impact**
- **Proceed With Caution**

## I. PCs AND INTEGRATION - A COMMON COMPETITIVE EDGE

- INPUT has analyzed five additional markets that are profiled in the main report. These markets have several characteristics in common.
  - They are all mid-sized, cross-industry markets, with 1988 user expenditures ranging from \$1.5 billion to \$3.0 billion.
  - Keys to success in these markets involve personal computers and applications integration as important elements.
- The engineering and scientific market will grow to \$2.0 billion by 1988 on a 18% AAGR. Vendors should incorporate intelligent engineering workstations into their product strategies in order to respond to strong user demands. In addition, emphasis should be placed on applications integration.
- The overall human resources market will be \$2.2 billion by 1988, an 8% AAGR for the next five years. Human resource market opportunities can be significantly enhanced by the integration of related application areas, such as cash management, new benefit options, and project staffing scheduling. Personal computer links to the human resource data base will be increasingly important.



## **PCs AND INTEGRATION: A COMMON COMPETITIVE EDGE**

- **Mid-sized Markets (\$1.5-3.0 Billion)**
- **Engineering and Scientific (\$2.0 Billion, 18% AAGR)**
- **Human Resources (\$2.2 Billion, 8% AAGR)**



## J. PCs AND INTEGRATION - A COMMON COMPETITIVE EDGE (continued)

- Utility processing will be the largest of the mid-sized cross-industry markets by 1988 with \$2.6 billion in expenditures. This represents, however, the slowest AAGR of all the cross-industry markets, 7%. Vendors can increase their success rate by offering services that integrate information from diverse locations. In addition, providing resources and expertise related to personal computers, especially for input/output functions, will prove beneficial.
- The education and training market for information services promises a high AAGR (26%) and a good-sized market by 1988 (\$1.8 billion). Computer-assisted instruction (CAI) will show a phenomenal 72% AAGR during the next five years. This delivery mode, when integrated with personal computers as well as mainframes, offers exciting potential.
- The on-line data base market is also a very healthy mid-sized cross-industry market. It will grow to \$1.7 billion by 1988, propelled by a 22% average annual growth rate. The proliferation of personal computers will result in a shift in this market away from dedicated terminals and toward the PC. Processing services vendors doing transaction processing for a number of customers with common characteristics should investigate ways to spin off data from those activities that can be used to establish a data base service. This integration of processing and on-line data base offerings is an excellent way to leverage resources.

## **PCs AND INTEGRATION: A COMMON COMPETITIVE EDGE (CONTINUED)**

- **Utility Processing (\$2.6 Billion, 7% AAGR)**
- **Education and Training (\$1.8 Billion, 26% AAGR)**
- **On-line Data Bases (\$1.7 Billion, 22% AAGR)**

**K. SUMMARY: PROVIDE AN INTEGRATED BUSINESS STRATEGY TO  
SELECTED MARKETS**

- Demand for information services is soaring. Today's \$31 billion market will almost triple by 1988. All delivery modes are doing well.
- The cross-industry market is likewise healthy. It encompasses 36% of today's market and will be 40% of the 1988 market.
- The key challenge to vendors is devising a strategy that will strike a profitable balance between two historically opposing user requirements: the need for more powerful systems and the desire for easier to use interfaces to those applications.
- Profitable strategies for the next five years will integrate products, delivery modes, and distribution channels toward a well-defined target market.
  - Related applications must be integrated via DBMS.
  - Vendors must provide a variety of delivery modes. Expertise must be based on application and industry knowledge, rather than delivery mode.
  - Personal computer links must be offered to central data bases. Fourth-generation languages must be incorporated to facilitate data access.
  - Joint ventures should be seriously considered in order to expedite marketplace entry and penetration.
- The new ways hold much promise. They do, however, demand more vendor change than required previously. Effective management of that change process is the key to success in the mid-80s.

## **SUMMARY**

# **PROVIDE AN INTEGRATED BUSINESS STRATEGY TO SELECTED MARKETS**

- **\$81 Billion Opportunity**
- **Users Want it All**
- **Integrate Products, Delivery Modes, and Channels to More Focused Markets**
  - **PC Links**
  - **DBMS**
  - **Fourth-Generation Languages**
  - **Joint Ventures**
- **Make Management of Change a Top Priority**



### III ENVIRONMENTAL DEVELOPMENTS





### III ENVIRONMENTAL DEVELOPMENTS

- End-user computing is of critical importance to the information services industry because:
  - High growth rates are projected.
  - Many new (and new kinds of) customers are being created.
  - Information services delivery modes are being changed.
- This chapter analyzes the end-user computing environment and examines some of the opportunities available to information service vendors.

#### A. THE END-USER COMPUTING ENVIRONMENT

- End-user computing consists of three delivery modes.
  - RCS.
  - Information centers (ICs) (which functionally greatly resemble RCS).
  - Personal computers (PCs).
- The specifically end-user aspects of these modes are propelled by fourth-generation language (FGL) software. The general characteristics, major types, and examples of FGLs are shown in Exhibit III-1.

EXHIBIT III-1  
FOURTH-GENERATION LANGUAGES

Characteristics

- Nonprocedural (i.e., focuses on the result, rather than the process of obtaining the result).
- English-like.
- Nontechnical.
- Flexible.
- Fast initial learning period.
- Often has built-in functions (e.g., DBMS, statistics, financial, graphics, text editor).

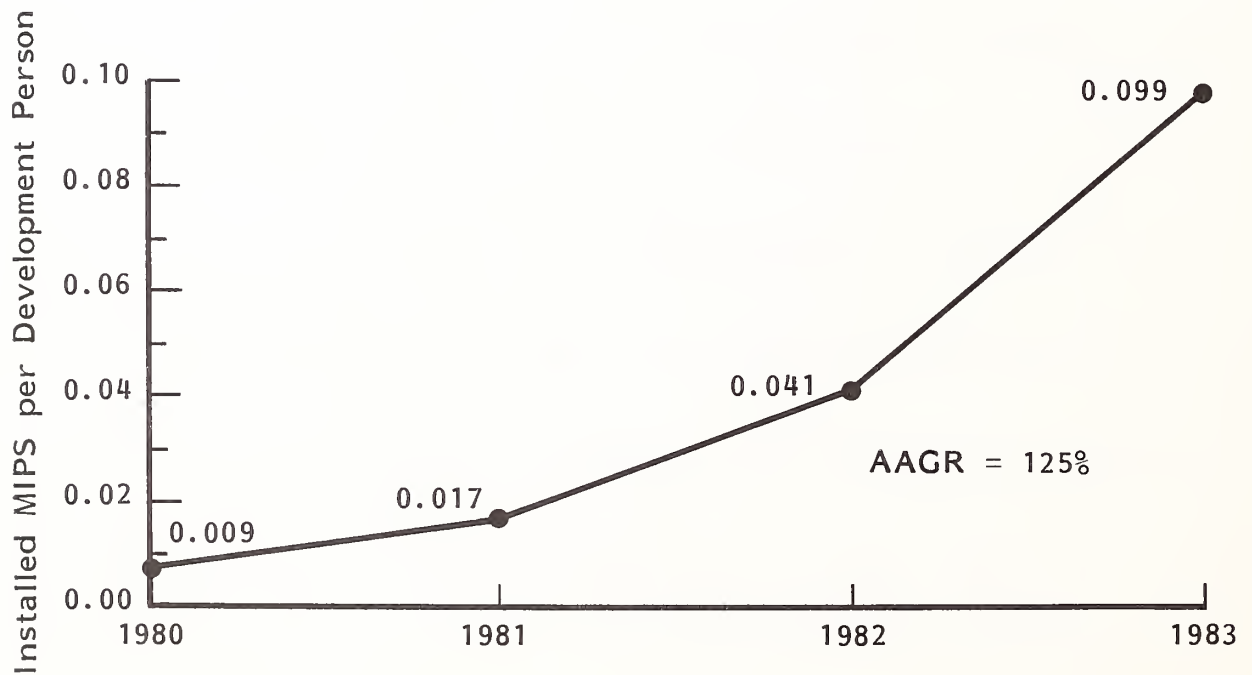
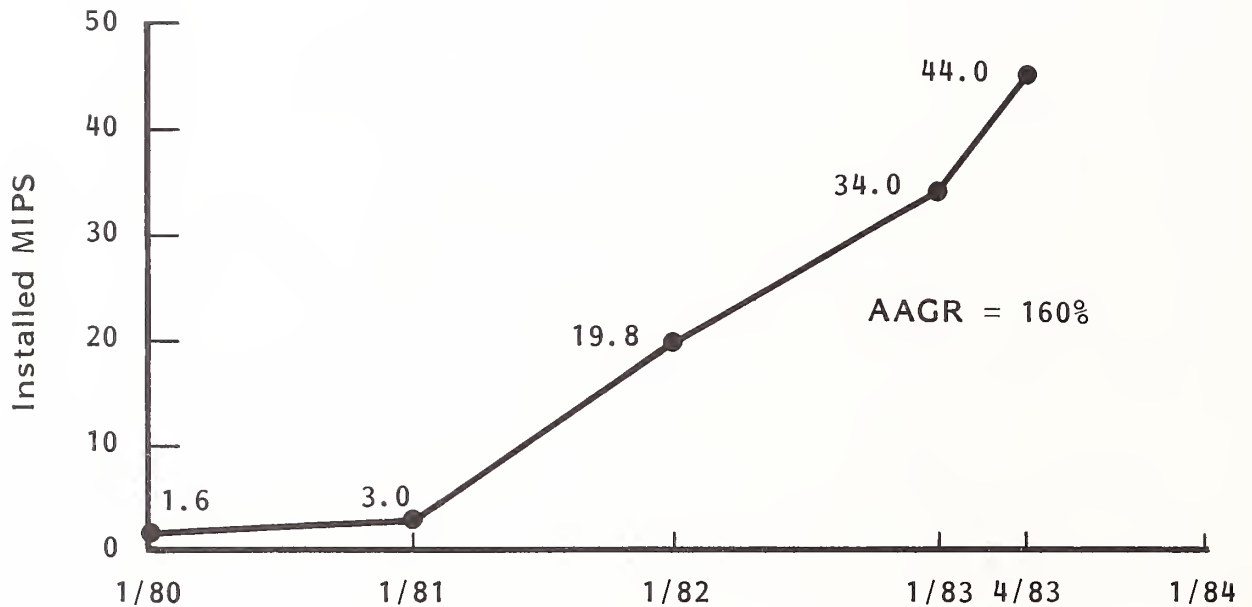
MAJOR TYPES	PRODUCT EXAMPLES
Generalized Tool	FOCUS INQUIRE RAMIS II NOMAD 2
Tools Linked to a Specific Data Base Product	NATURAL IDEAL On-line English
Application Generators	MARK V MANTIS
Modeling Languages	EXPRESS System W VisiCalc 1-2-3

- FGLs were originally developed for mainframe use. They are quite resource hungry, as shown in Exhibit III-2, because:
  - They are generally less efficient than equivalent COBOL programs.
  - Their ease of use permits:
    - One person to produce more output (often increasing output by a factor of five or more).
    - Many more people (i.e., end users) to produce programs.
- These effects on costs can be significant, as shown in Exhibit III-3.
- In spite of reservations concerning FGL resource consumption, projected use of FGLs is high, as shown in Exhibit III-4. This increase is fueled by (in order of decreasing importance):
  - Backlog increases (in both the "visible" and "invisible" backlog).
  - Improvements in hardware performance.
  - Increases in programming costs.
  - Improvements in FGLs.
- The two major delivery modes foreseen are ICs and PCs.
  - IC users (mainly using FGLs) are expected to increase several hundred percent by 1985, as shown in Exhibit III-5.

EXHIBIT III-2

INSTALLED MIPS AFTER  
FOURTH-GENERATION LANGUAGE INSTALLATION

Total Installed MIPS After Conversion



SOURCE: INPUT Survey



### EXHIBIT III-3

#### COST IMPACT OF FOURTH-GENERATION LANGUAGE USE AT DIFFERENT STAFFING LEVELS

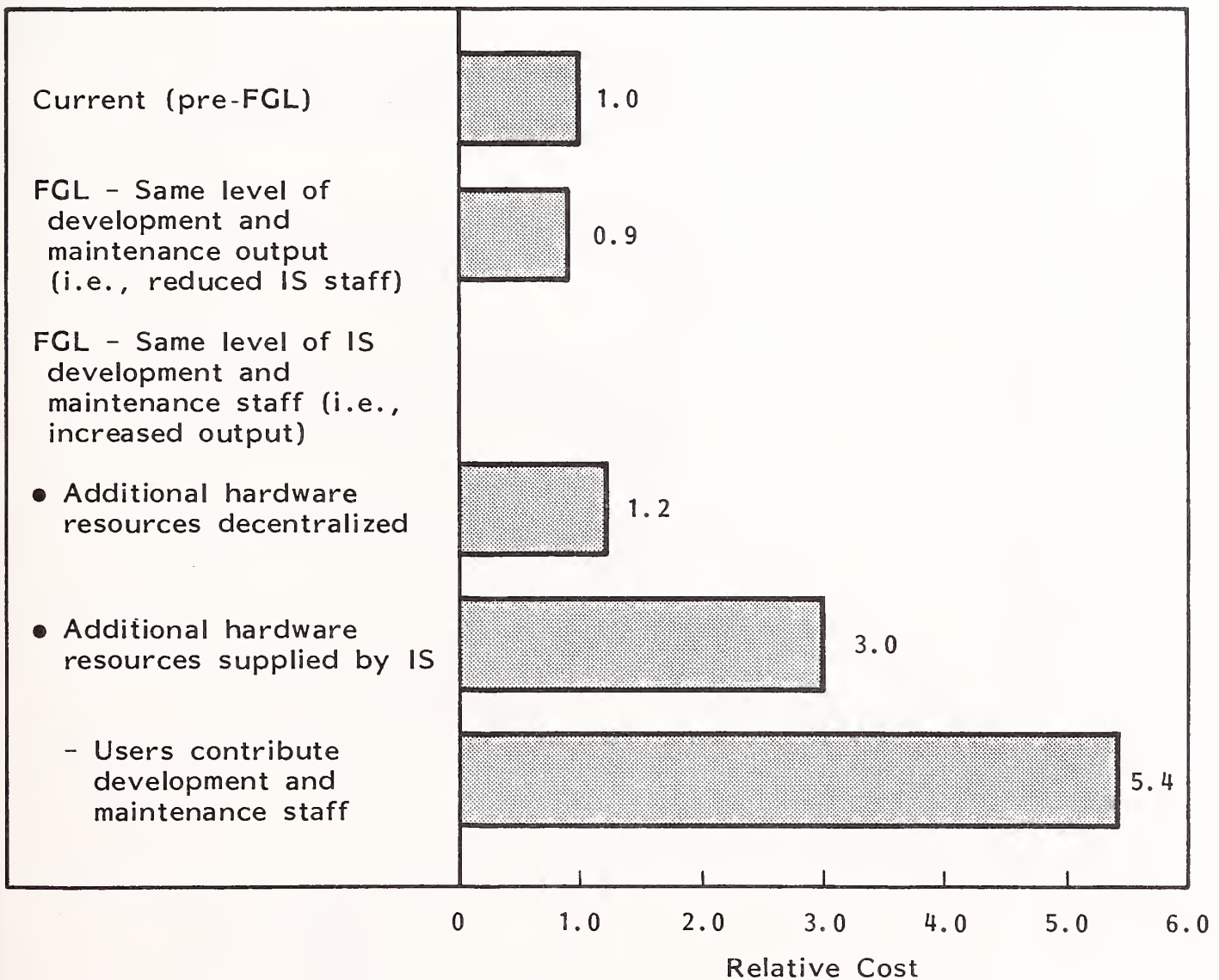
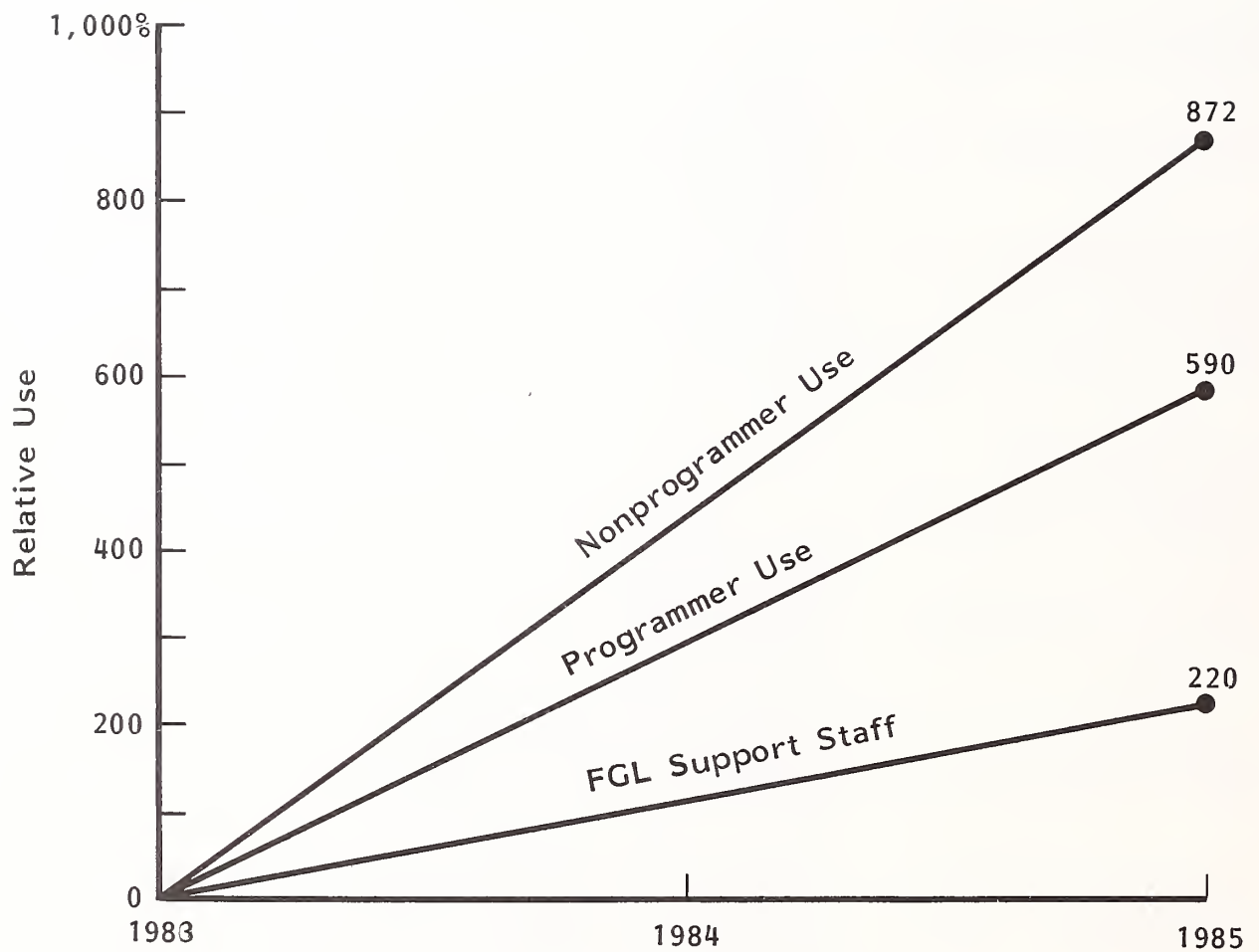


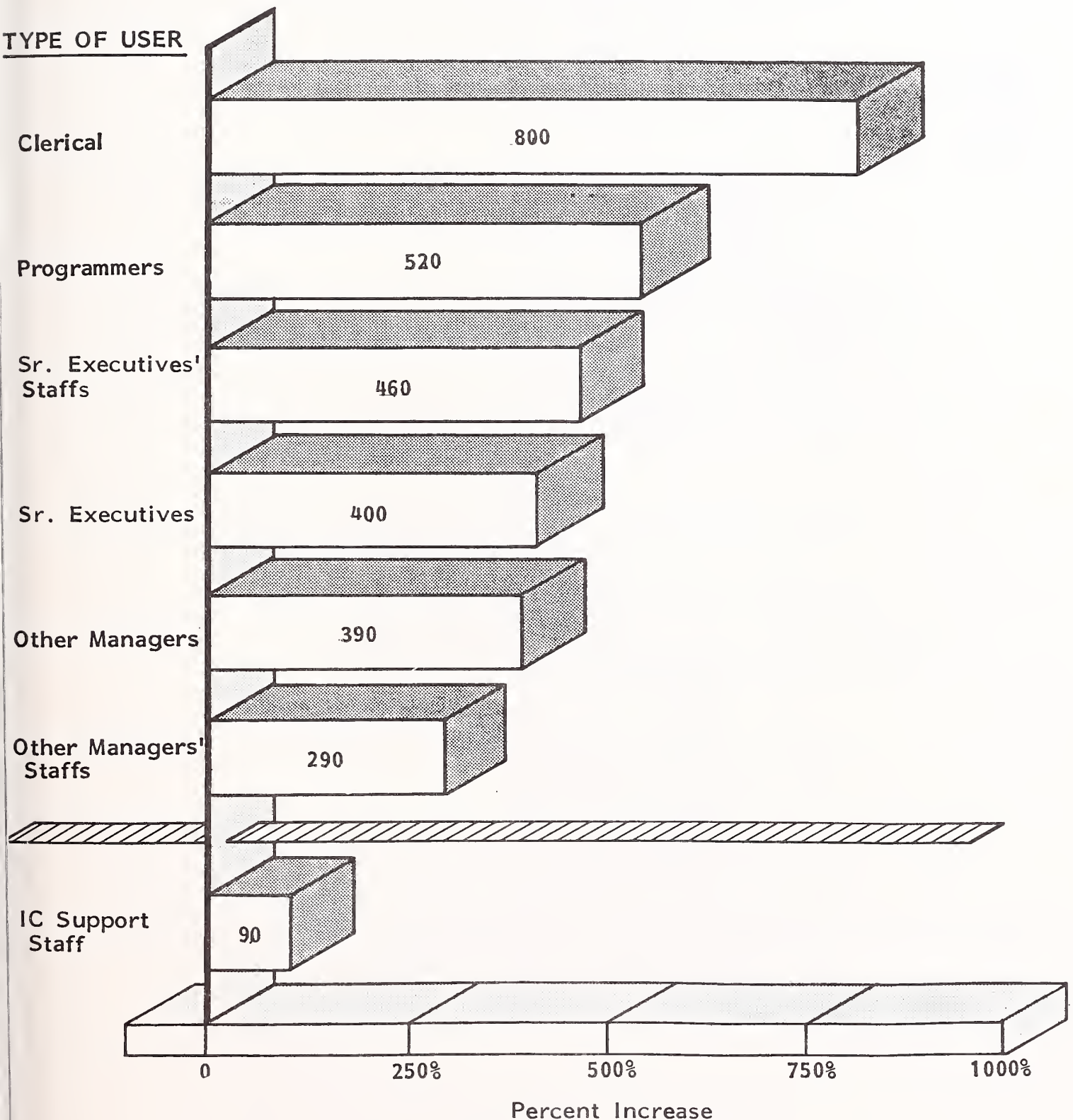
EXHIBIT III-4

PROJECTED FOURTH-GENERATION LANGUAGE-RELATED  
INCREASES 1983 TO 1985



# EXHIBIT III-5

## EXPECTED GROWTH IN NUMBER OF INFORMATION CENTER USERS, BY TYPE OF USER: 1983 TO 1985



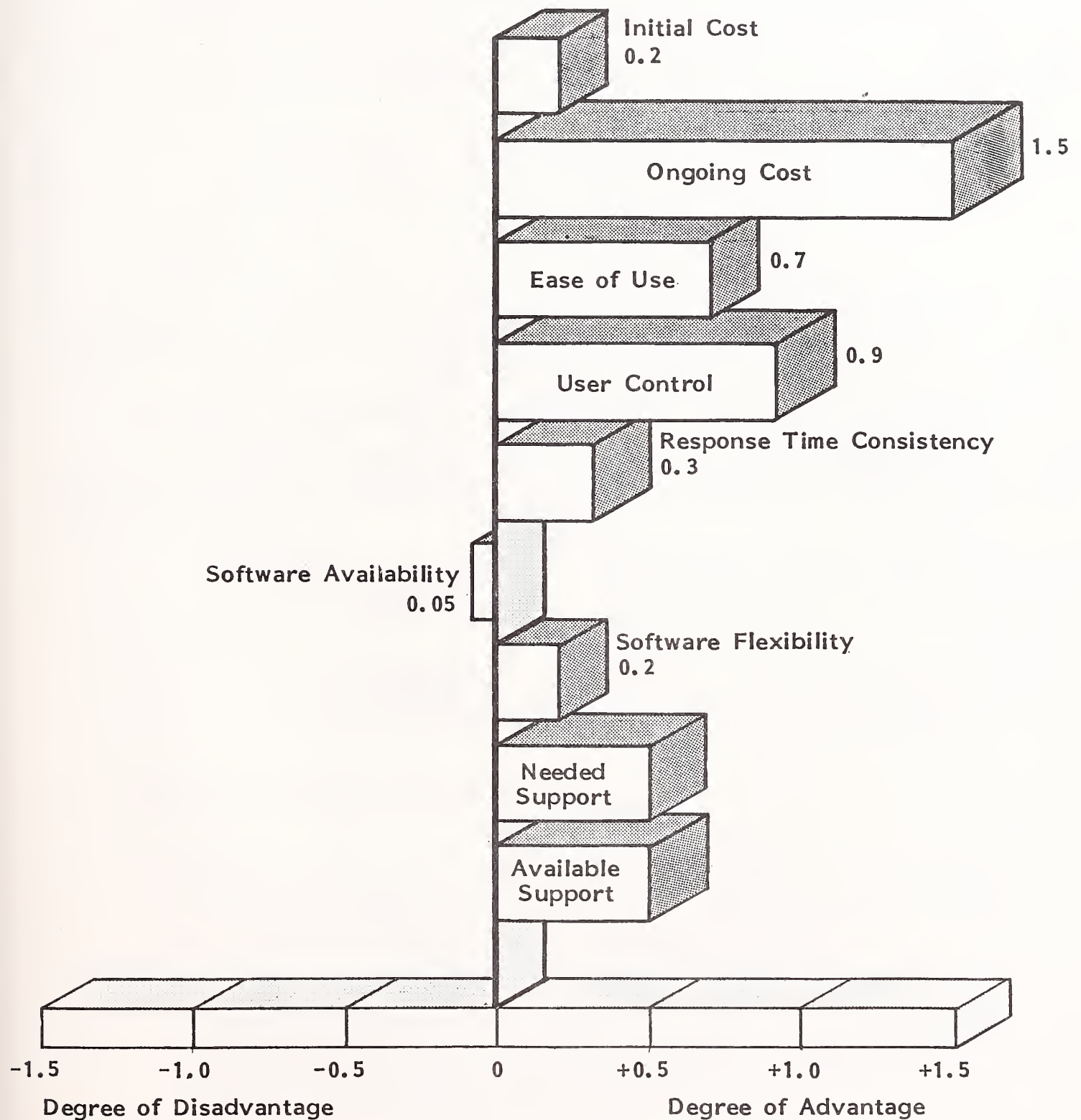
SOURCE: INPUT Survey of IS/IC Managers

- Most of the increase in IC terminals is expected to be in "intelligent" terminals (largely PCs).
- ICs are viewed by both information systems staffs and end users as being more attractive in virtually every area compared to traditional commercial timesharing, as shown in Exhibit III-6.
- PC growth is also expected to be very high.
- FGLs represent a way to link, not only PCs and ICs, but the IC and the traditional data processing operation, as shown in Exhibit III-7.
- Virtually every FGL vendor has announced or is planning a micro version of its FGL, generally with data linkages possible between the mainframe and micro.
  - Most are planning to use a PC (generally the IBM PC) as the micro host.
  - Others (like Management Decision Systems with EXPRESS) are planning to offer integrated systems based on super PCs.
- This approach will put very powerful software tools directly in the hands of the end user (and professional programmers as well).
  - This will greatly reduce the problem of FGLs being perceived as high utilizers of hardware resources.
  - One of the principal uses that FGL vendors and others see for the PC version of FGLs is for end users who develop their own FGL applications that can then be run on mainframes. These applications can be either decision support applications or production-type systems.



# EXHIBIT III-6

## ADVANTAGES AND DISADVANTAGES OF THE INFORMATION CENTER COMPARED TO COMMERCIAL TIMESHARING

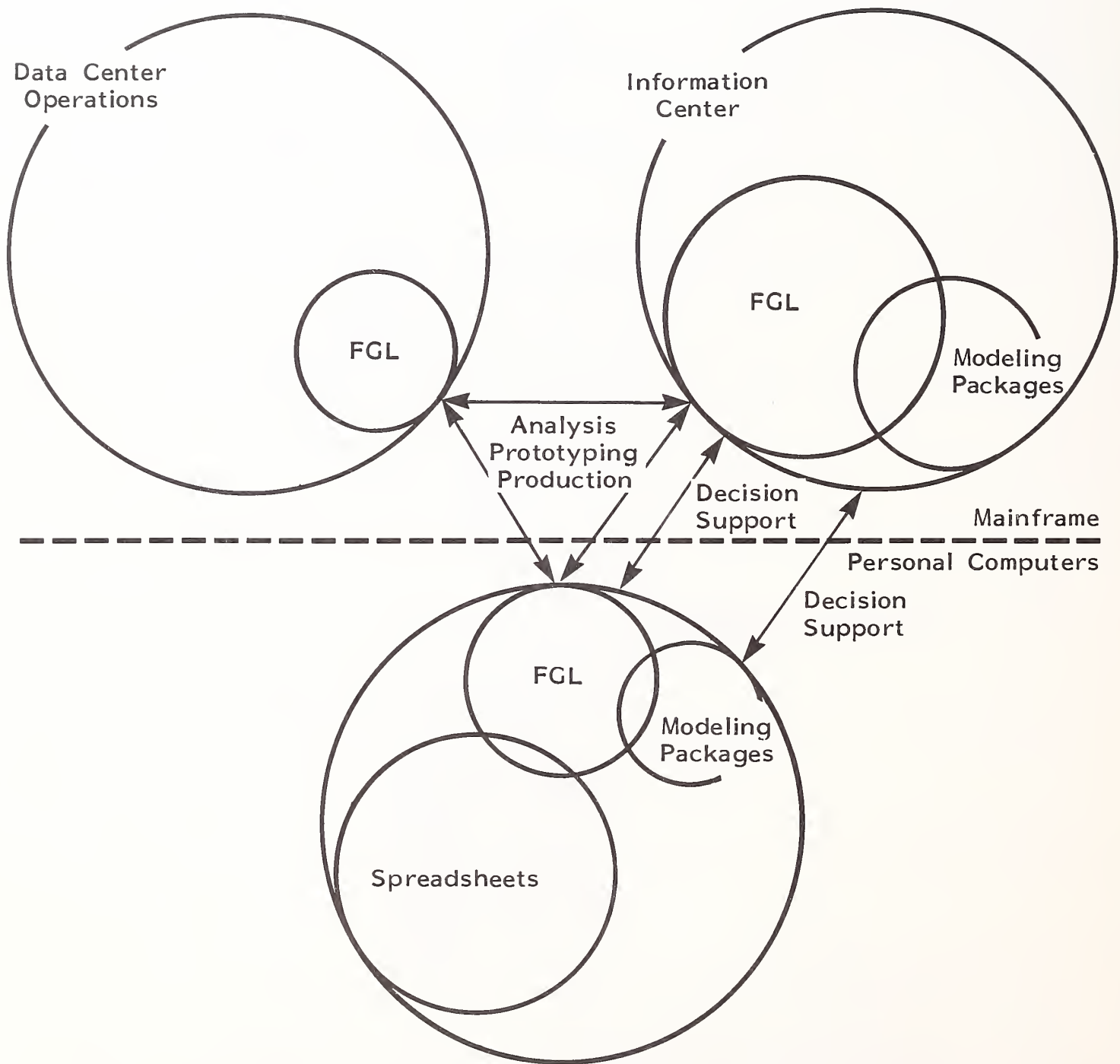


(2.0 = Maximum Advantage or Disadvantage)

SOURCE: INPUT Survey of IS/IC Managers



EXHIBIT III-7  
FOURTH-GENERATION LANGUAGES –  
THE EMERGING LINK (1984-1985)



Linkages are Shown as: →

- It will be some time before FGLs play a major role in production systems, but the handwriting is already on the wall.
- This raises the issue of the long-term future for applications software. In many cases an information systems/end-user team could with an FGL construct very quickly exactly the application that they need.
  - This approach can include both prototyping and ongoing testing to construct much more robust systems, as shown in Exhibit III-8.
  - The benefits are even greater for modification and maintenance, since changes can be made much more easily.
- FGLs used to construct applications will attack applications software packages in their weakest spot - the necessary tradeoff made between tailoring and uniformity.
  - Users really want highly tailored applications that meet what they perceive to be their unique business needs.
  - Packaged software must, at the core, remain constant in order to provide economical development, installation, and support.

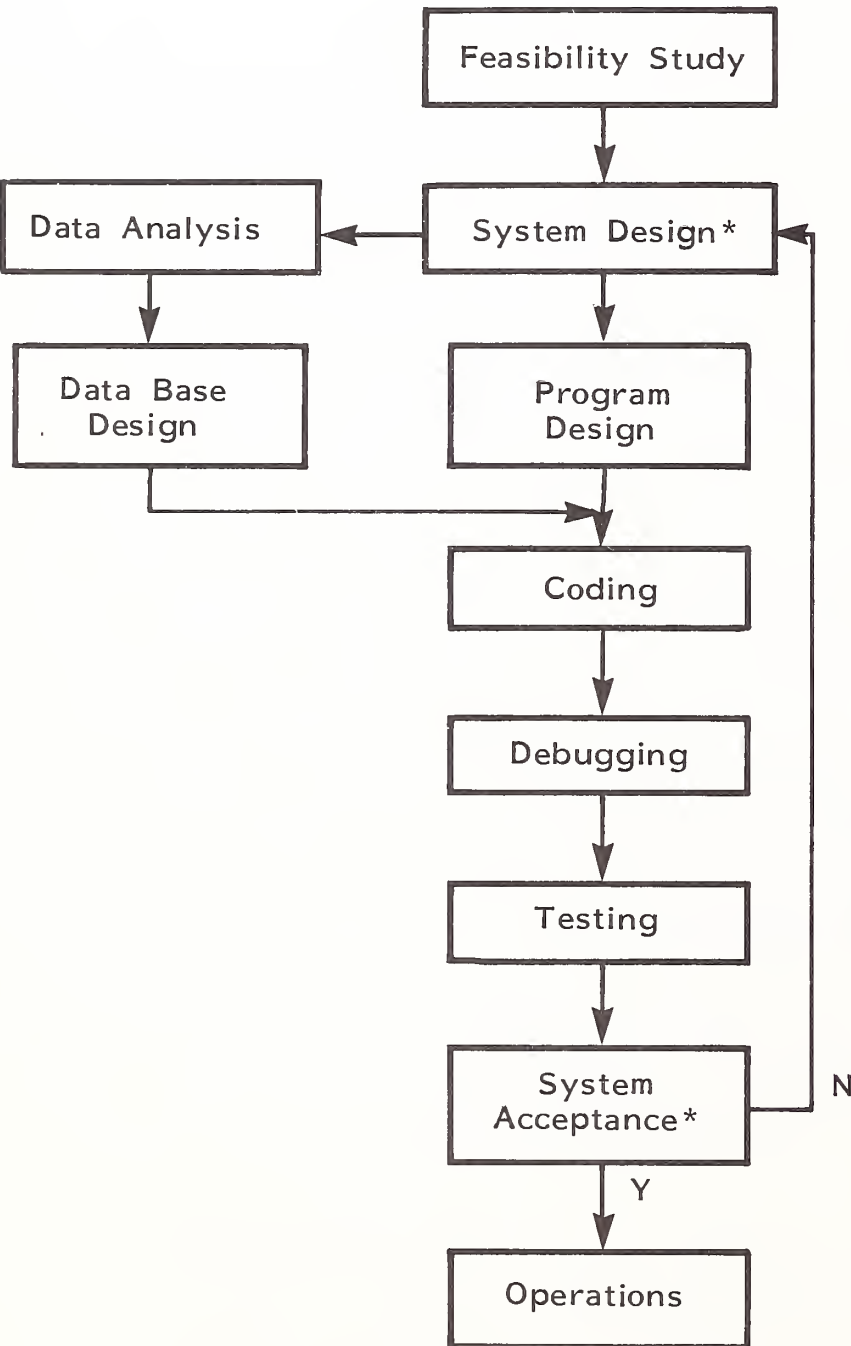
## **B. OPPORTUNITIES IN END-USER COMPUTING**

- RCS-based end-user services are not necessarily condemned to a slow (or fast) death. RCS implementation speed, response time, and ease of use are still generally superior compared to most ICs, as shown in Exhibit III-9.
- Specialized applications will always find a market where there is high value added from hard-to-duplicate knowledge or service. Realistically, of course, where these applications have grown into sizable

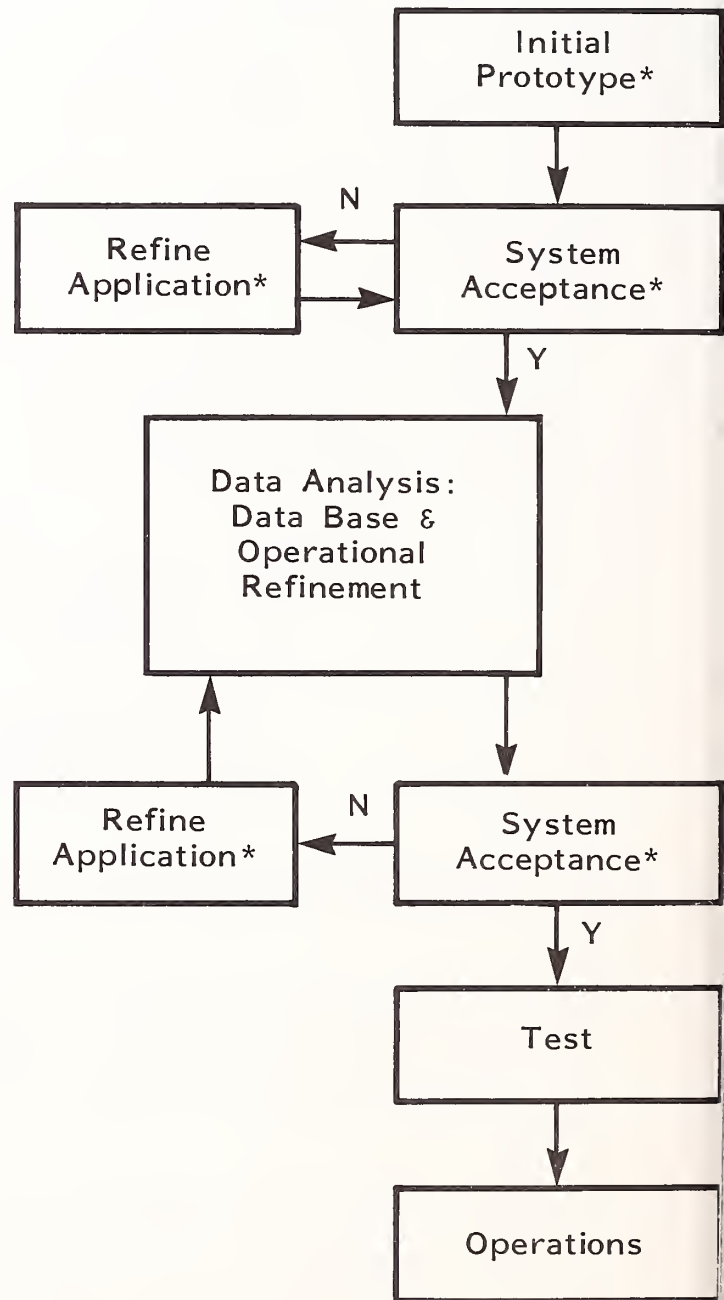
# EXHIBIT III-8

## CONTRASTS IN TRADITIONAL AND FOURTH-GENERATION LANGUAGE SYSTEM DEVELOPMENT

### Traditional Development



### FGL Development



\* Significant User Involvement

# EXHIBIT III-9

## CHARACTERISTICS OF COMPUTING ALTERNATIVES FROM THE USER'S VIEWPOINT

CHARACTERISTIC	COMPUTING ALTERNATIVES		
	PERSONAL COMPUTER	COMMERCIAL TIMESHARING	IN-HOUSE TIMESHARING/ INFORMATION CENTER
Initial Entry Cost (For a Department)	Low	Very Low	Very Low
Operating Costs (For a Department)	Very Low	High*	Medium
Corporatewide Costs	Medium to High	High*	High*
Demands on User Personnel	Medium to High	Low to Medium	Medium
User Control	High*	Medium to High	Medium
Application Flexibility	Medium to High	Medium to High	Medium
Features Available	Medium to High	High	Medium
Response Time Consistency	High*	High*	Medium*
Application Implementation	High*	High*	Low to Medium
- Speed	High*	High*	Medium to High
- Cost	Low to Medium	High*	Low to Medium*
- Ease of Use	Medium to High	High	

\* Key Factors Determining Acceptance

SOURCE: INPUT Survey

markets there will be competitors emerging to offer similar functions in software to operate on an in-house mainframe or PC.

- It makes more sense for an RCS firm to market the software itself, rather than allow another firm to obtain the business. However, making this product transition with a customer calls for an acute sense of timing to prevent avoidable loss of RCS business while at the same time retaining the initiative on making such a transition.
- However, ICs are obviously "in." If nothing else, the words "information center" are much more alluring than "in-house timesharing."
- Several RCS firms (e.g., Comshare and NCSS) are offering an integrated package of IC support services, even to the extent of offering a facilities management arrangement.
- It is not clear how enthusiastic customers will be for this type of service.
  - One of the most important reasons for setting up an IC is cost-avoidance. The vendor cost is hard; most benefits will be soft.
  - This tendency to skimp on support is shown in the much lower growth foreseen by IS managers in both FGL and IC support staff, compared to the growth in usage (see Exhibits III-4 and III-5).
- This means that sellers, in order to be successful, must be able to show benefits that meet important needs of users. Even this is complicated by the fact that often end users do not pay for IC use or do so in "funny money."

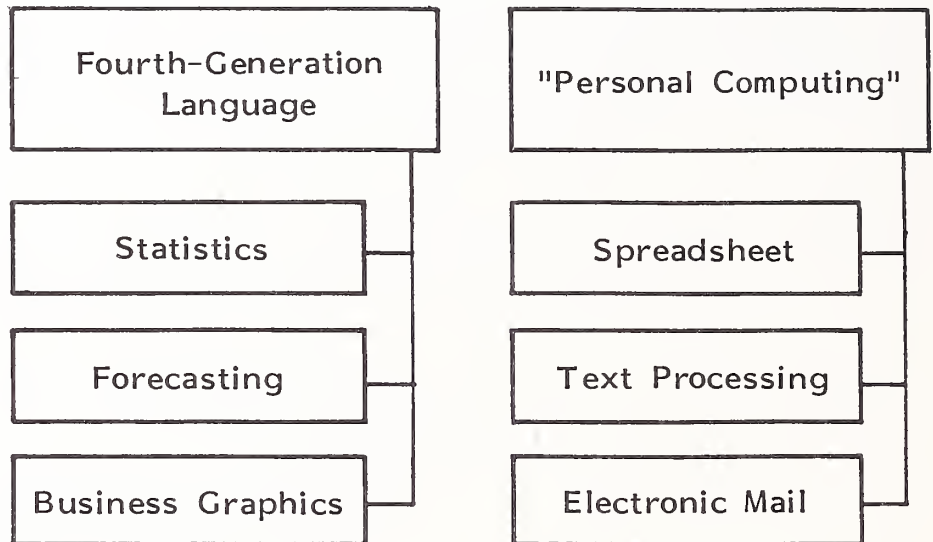


- An associated opportunity is to be able to offer a full "IC software portfolio," as shown in Exhibit III-10. No vendor is able to offer this yet; the benefits of being the first to offer products that are even average in all of these areas should be considerable.
- PC software itself is obviously a very high-growth market. However, this is a difficult market to deal with.
  - Product positioning is extremely volatile.
  - Successful distribution approaches, especially to corporate accounts, are still unclear.
  - Piracy by vendors and copying by users are becoming ever larger problems.
  - Bundling by hardware vendors, while specifically a way of getting volume, places a premium on a few "names."
  - Small firms can pull down the margins for the entire sector.
- The PC software market will undoubtedly go through a shakeout similar to that now occurring on the hardware side.
  - Competition will be intense in the integrated package area. Exhibit III-11 shows some of the different architectures used for achieving popular "integration" and compatibility features.
  - There will be increasing de facto standards in certain software areas, just as the IBM PC has emerged as the de facto hardware standard. Exhibit III-12 shows the overlapping evolution of focal points of standardization concerns.

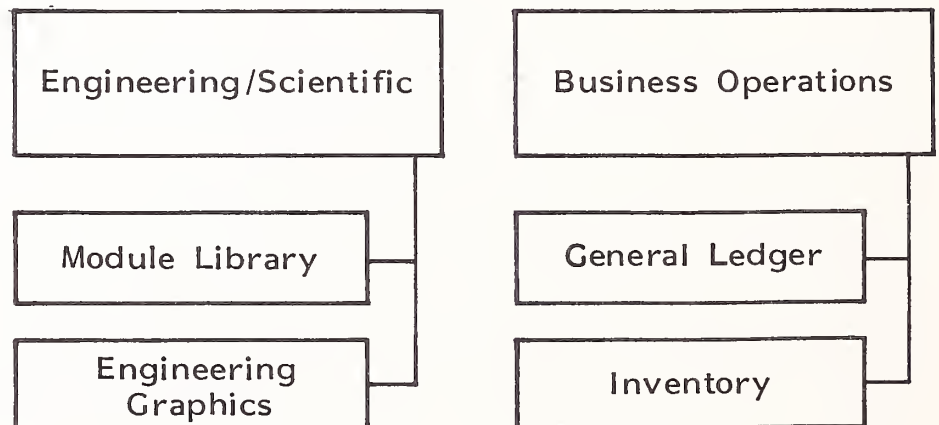
EXHIBIT III-10

INFORMATION CENTER SOFTWARE PORTFOLIO

GENERAL:



APPLICATION SPECIFIC:



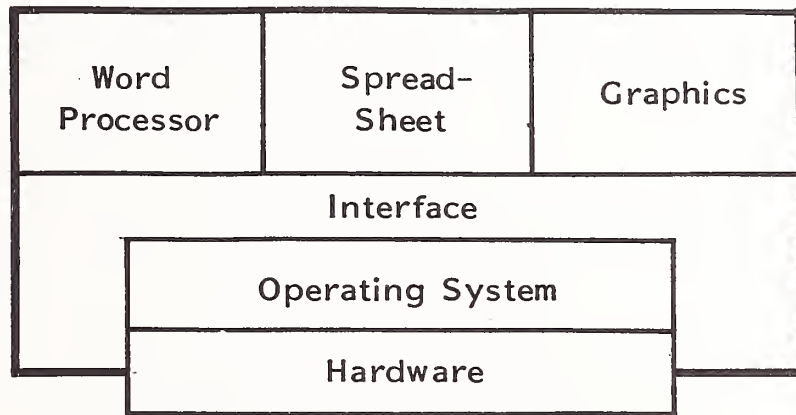
PROGRAMMER SUPPORT:



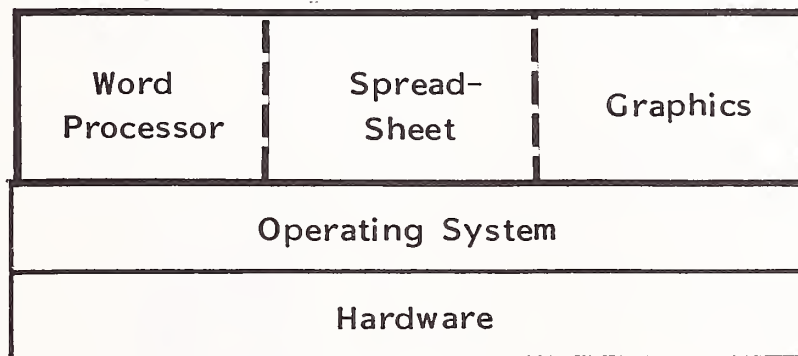
# EXHIBIT III-11

## SOFTWARE INTEGRATION LEVELS

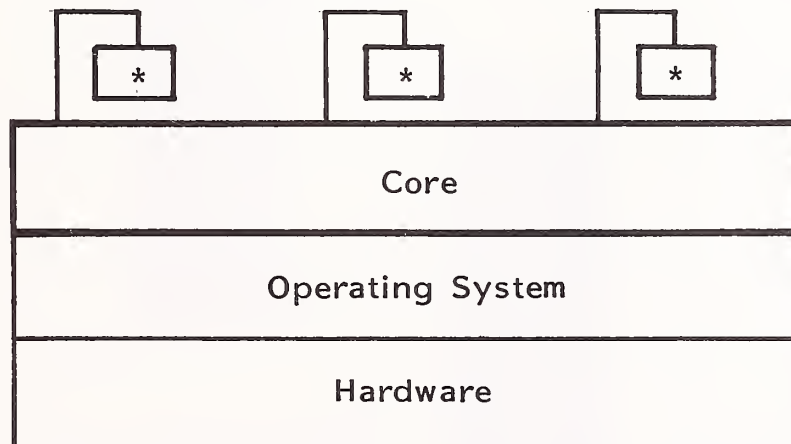
LEVEL 3:  
UNITED  
SOFTWARE  
ENVIRONMENT



LEVEL 2:  
MULTI-FUNCTIONAL  
PACKAGE



LEVEL 1:  
CORE  
PACKAGE  
WITH HOOKS



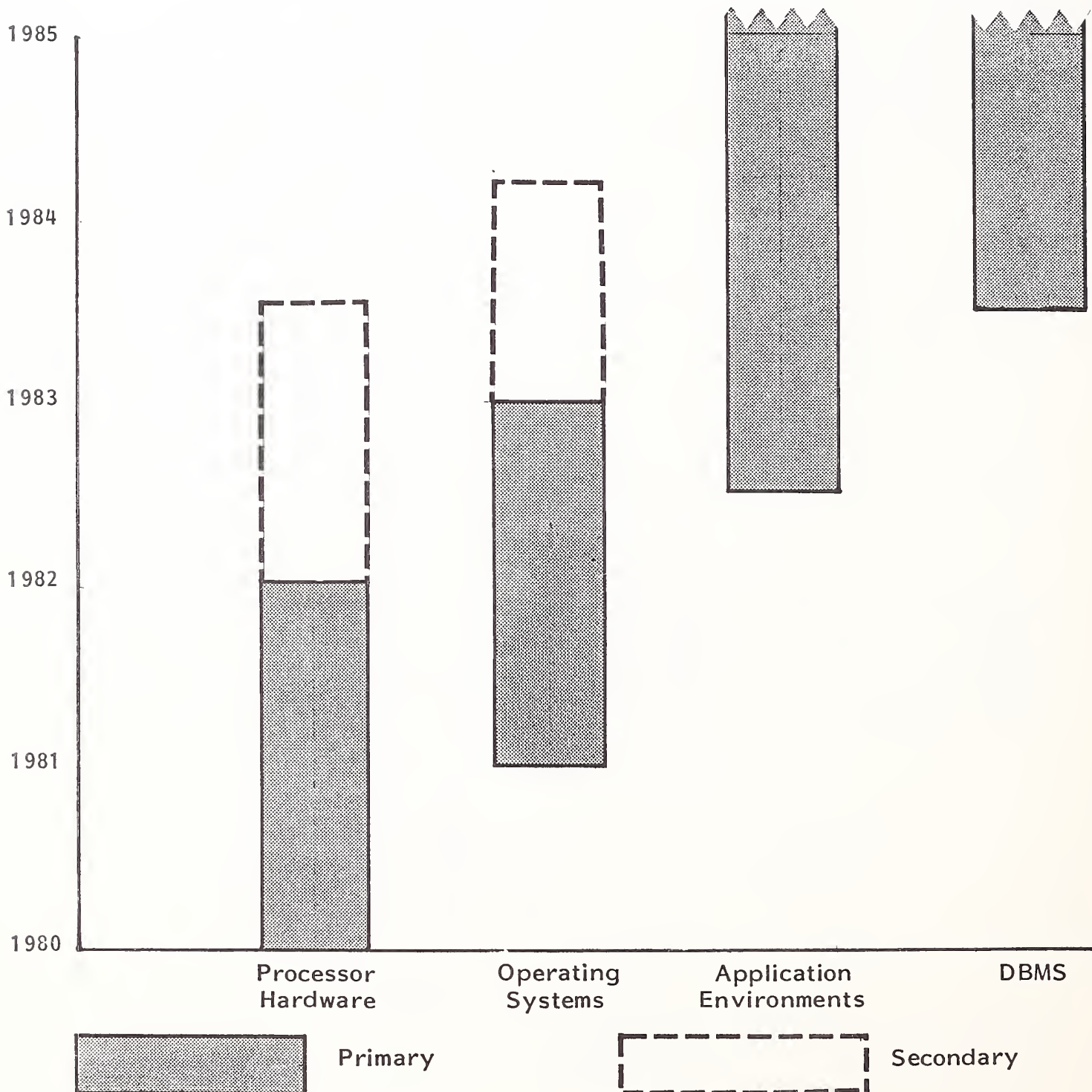
\* Spreadsheets, Word Processors, Etc.

LEVEL 0:  
DATA EXCHANGE



## EXHIBIT III-12

### PERSONAL COMPUTER STANDARDIZATION ERAS

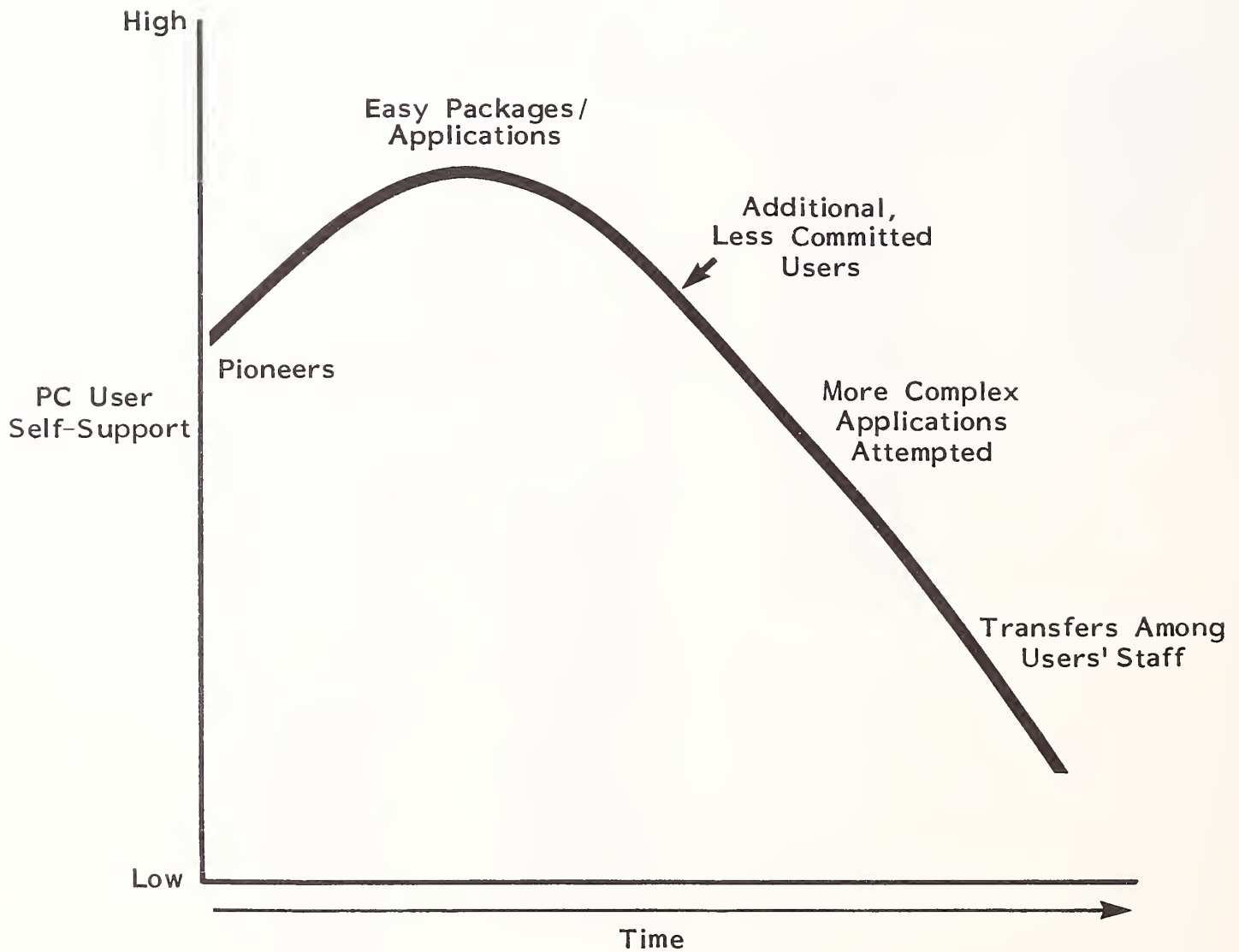


- One significant area of opportunity is to provide PC software support. Until recently, the amount of support needed has been masked by the self-sufficiency of PC pioneers, as shown in Exhibit III-13.
  - While the need is large, it would be a mistake to believe that PC software support is very similar to mainframe software support. Details are shown in Exhibit III-14.
  - Cost-effective means of both selling and supplying the service will have to be developed.



EXHIBIT III-13

THE PC USER SELF-SUPPORT CURVE  
(Current Technology)



# EXHIBIT III-14

## CONTRASTING PERSONAL COMPUTER SOFTWARE SUPPORT TO CONVENTIONAL SYSTEM SOFTWARE SUPPORT

	CONVENTIONAL SYSTEM SOFTWARE SUPPORT	PERSONAL COMPUTER SOFTWARE SUPPORT
Need to Interface Technically with End Users	Low	High
Need for End-User Training	Low	High
Diversity of Software	Low	High
IS Understanding of Software		
-Technical	High	Medium to Low
-Substance	Medium	Low
Development		
-Methodologies	Developed	Undeveloped
-Tools	Many	Few
-Language Understanding	High	Medium to Low
Vendor Support	Medium to High	Low



#### IV MARKET ANALYSIS





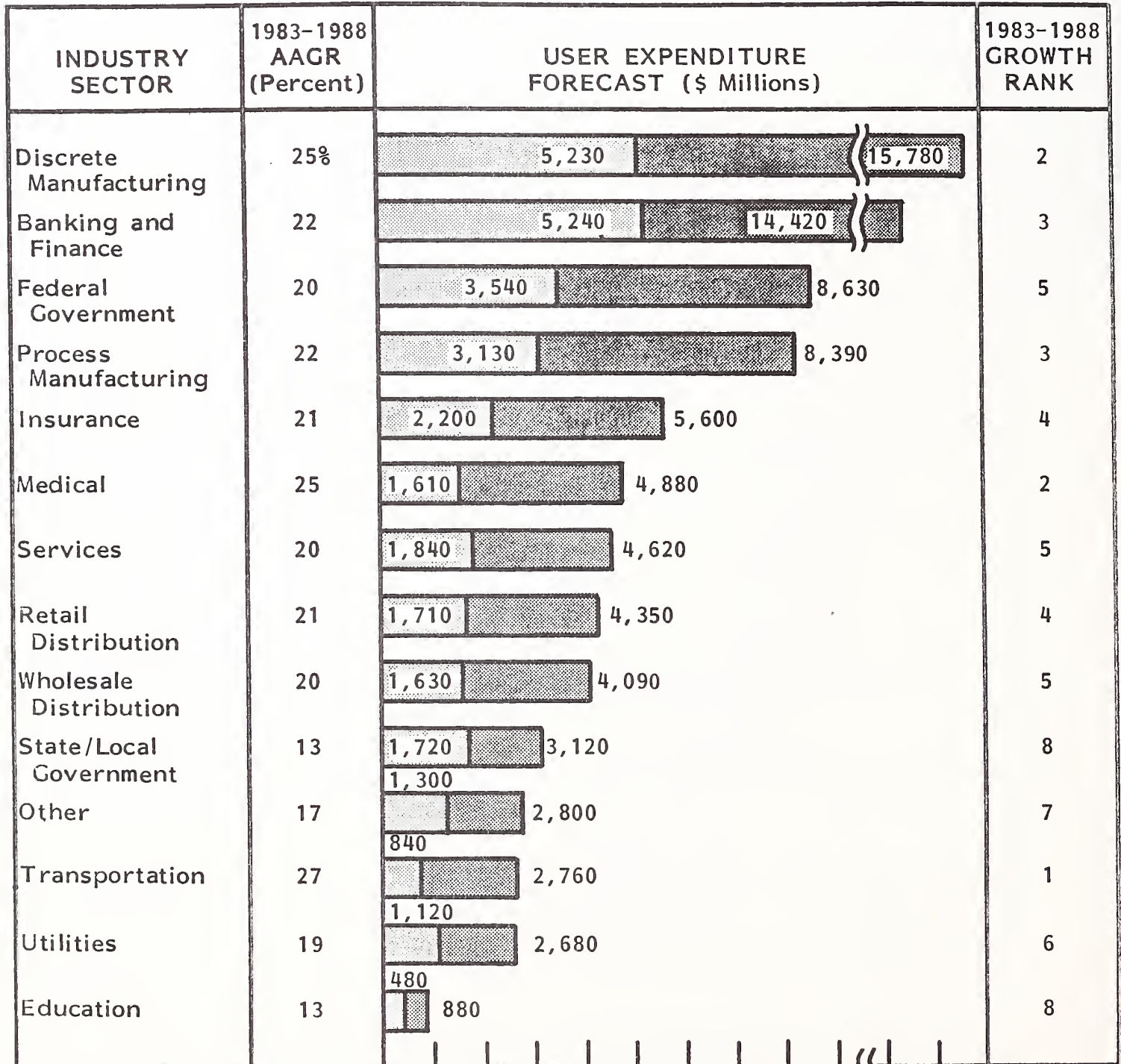
## IV MARKET ANALYSIS

### A. MARKET OVERVIEW

#### I. INFORMATION SERVICES MARKET OVERVIEW

- The total U.S. market for information services stands at \$31.6 billion in 1983. It is forecast to grow at an average rate of 21% per year over the next five years, reaching \$83.0 billion by 1988, as shown in Exhibit IV-1.
- In industry-specific terms, discrete manufacturing will be the largest market in 1988, reaching almost \$16 billion, triple its 1983 size.
- Discrete manufacturing's yearly growth of 25% over this period gives it a second place tie with the medical sector for fastest growth.
- Considering discrete manufacturing's large initial size, this rate of growth is all the more dramatic.
- Transportation, the fastest growing industry sector, is presently only one-sixth the size of the discrete manufacturing marketplace. On 27% annual growth, transportation should reach \$2.8 billion by 1988.
- Of the largest industry sectors, only the federal government is expected to experience below-average growth in demand, 20% per year over the forecast period.

EXHIBIT IV-1  
TOTAL U.S. INFORMATION SERVICES MARKET FORECAST  
RANKED BY 1988 SIZE



0      2,000      4,000      6,000      8,000      14,000      \$16,000

Total  
Market Size (\$ Millions)

1983	\$31,600	1983-1988 AAGR
1988	\$82,970	21%

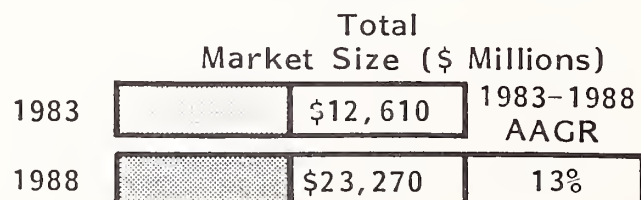
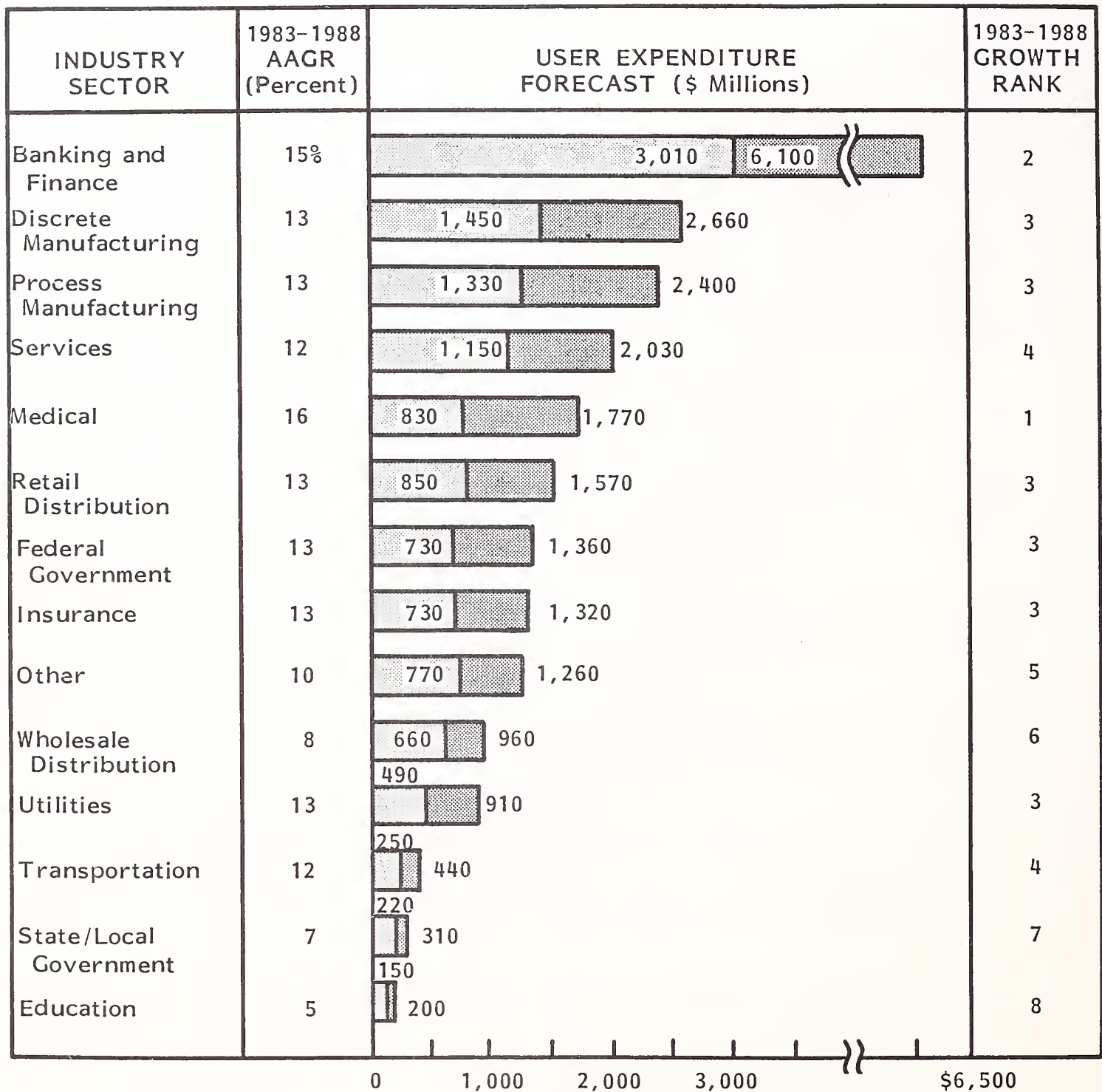
- An indicator of the growth of the industry as a whole is the fact that in 1981, 207 vendors posted revenues in excess of \$10 million. In 1982, 243 vendors had passed that mark. In 1981 these firms accounted for 57% of total industry revenues. By 1982 they had boosted their share to 58%.

a. Processing Services

- Processing services include remote computing, batch processing, and facilities management.
- These delivery modes combined account for \$12.6 billion in sales in 1983. The combined five-year forecast growth of 13% should make for \$23.3 billion in sales by 1988. Details are in Exhibit IV-2.
- As in the total information services marketplace, here also discrete manufacturing, and banking and finance are the largest subsectors. Banking and finance alone consume almost one quarter of the entire economy's processing services.
- Not surprisingly, over half of the 20 largest processing vendors have significant commitments to this marketplace.
- ADP is increasing its activity in this marketplace. In 1982, ADP surpassed CDC as the leading information services vendor.
- The fastest growing processing market is in the medical industry, where 16% annual average growth in demand should boost the market size from \$830 million in 1983 to \$1,770 million in 1988.
- Several of the top processing vendors have strong presences in the medical market.



EXHIBIT IV-2  
PROCESSING SERVICES MARKETS  
RANKED BY 1988 SIZE



- Exhibit IV-3 lists the largest processing services vendors.

b. Software Products

- As a whole, the market for software products is \$7.7 billion in 1983. It will experience the fastest growth of any of the four primary delivery modes over the next five years - 32% - and will quadruple in size, exceeding \$30 billion in revenues by 1988. Details are in Exhibit IV-4.
- Within the economy as a whole there is wide variation by industry sector in the forecasted size and growth in demand for software products.
  - From the largest sectors (discrete manufacturing, and banking and finance), present size declines to the smallest, education, where \$130 million of software products are bought this year.
  - Rate of growth in demand varies, from the 18% annual increase by state and local governments, to the 40% yearly growth in demand for transportation.
- Many of the largest software vendors are, understandably, hardware vendors, as shown in Exhibit IV-5. The fastest growing vendors are personal computer software vendors.
- Personal computer software is forecast to grow at a rate of 51% per year over the next five years. For details see Exhibit IV-6. Cross industry products that now make up 87% of all PC software will grow at 46% per year to \$3.11 billion by 1988, when they will make up 73% of all sales.
- Much of the dollar volume of this sector will flow to mainframe and mini-software vendors that incorporate subsets of larger packages into micro offerings.

## EXHIBIT IV-3

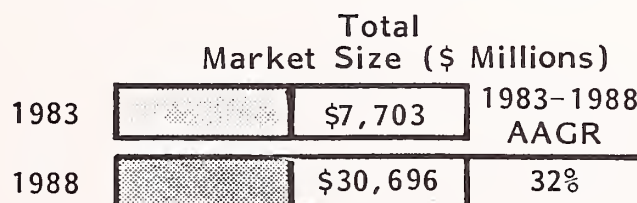
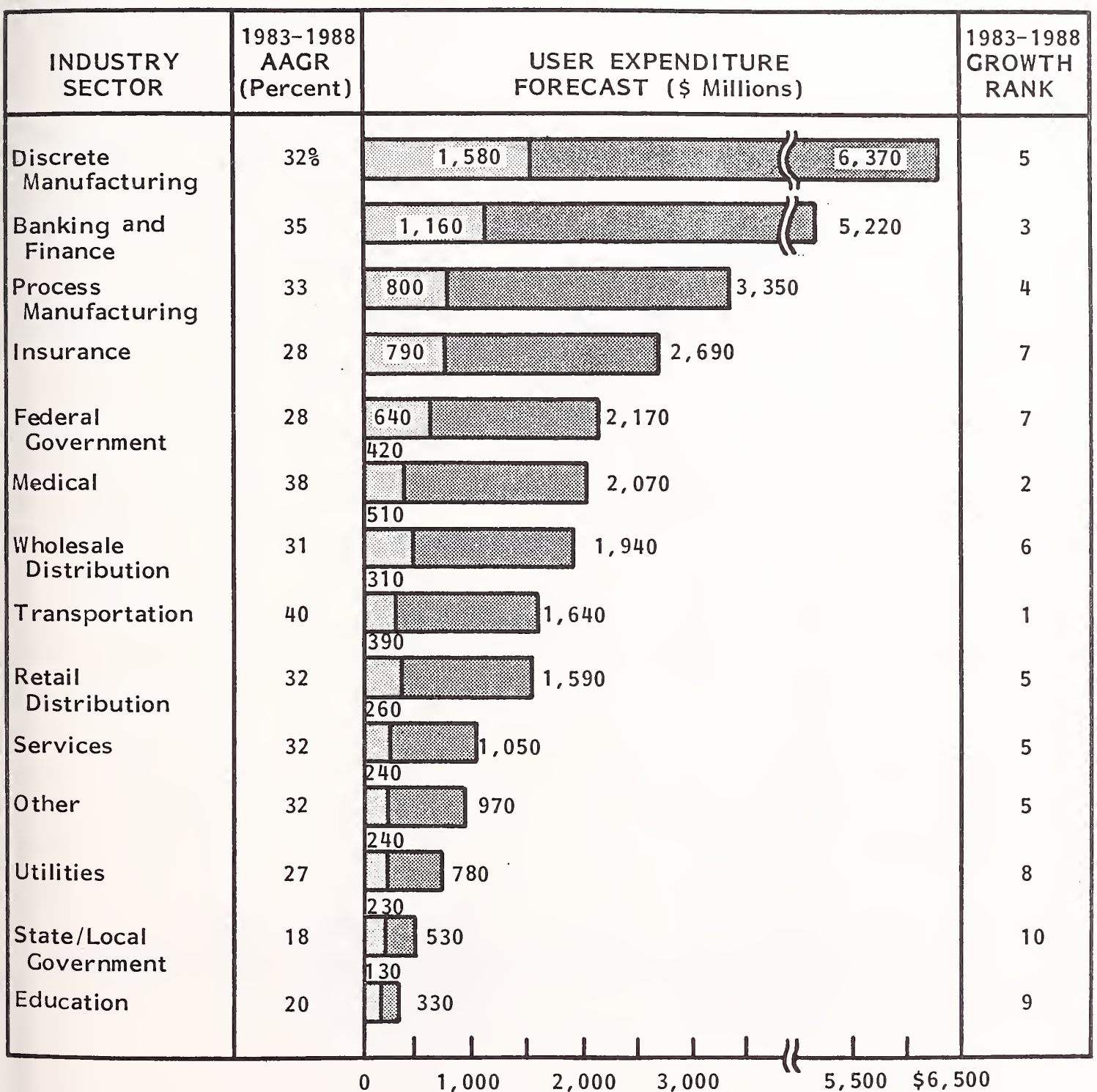
## LARGEST PROCESSING SERVICES VENDORS BY NONCAPTIVE U.S. REVENUE

RANK		COMPANY	CALENDAR YEAR REVENUES (\$ millions)		1981/1982 PERCENT GROWTH
1982	1981		1982	1981	
1	2	Automatic Data Processing, Inc. (ADP)	\$599	\$520	15%
2	1	Control Data Corporation (CDC)	590	541	9
3	3	General Electric Company	282	250	13
4	4	Electronic Data Systems Corporation (EDS)	256	236	8
5	5	Tymshare, Inc.	178	192	(7)
6	6	McDonnell Douglas Automation Company (McAuto)	177	155	14
7	9	Computer Sciences Corporation (CSC)	151	122	24
8	7	Litton Industries, Inc.	148	132	12
9	11	Shared Medical Systems Corporation	141	112	26
10	10	Equifax, Inc.	131	121	8
11	8	Dun & Bradstreet	126	128	(2)
12	12	National Data Corporation	116	107	8
13	16	Boeing Computer Services, Inc. (BCS)	115	93	24
14	14	Chase Manhattan Bank	114	97	17
15	16	Bradford National Corporation	110	97	13

NOTE: Growth rates are rounded and are based on revenues rounded to the nearest thousand; revenues shown are rounded to the nearest million.



EXHIBIT IV-4  
SOFTWARE PRODUCTS MARKETS  
RANKED BY 1988 SIZE



## EXHIBIT IV-5

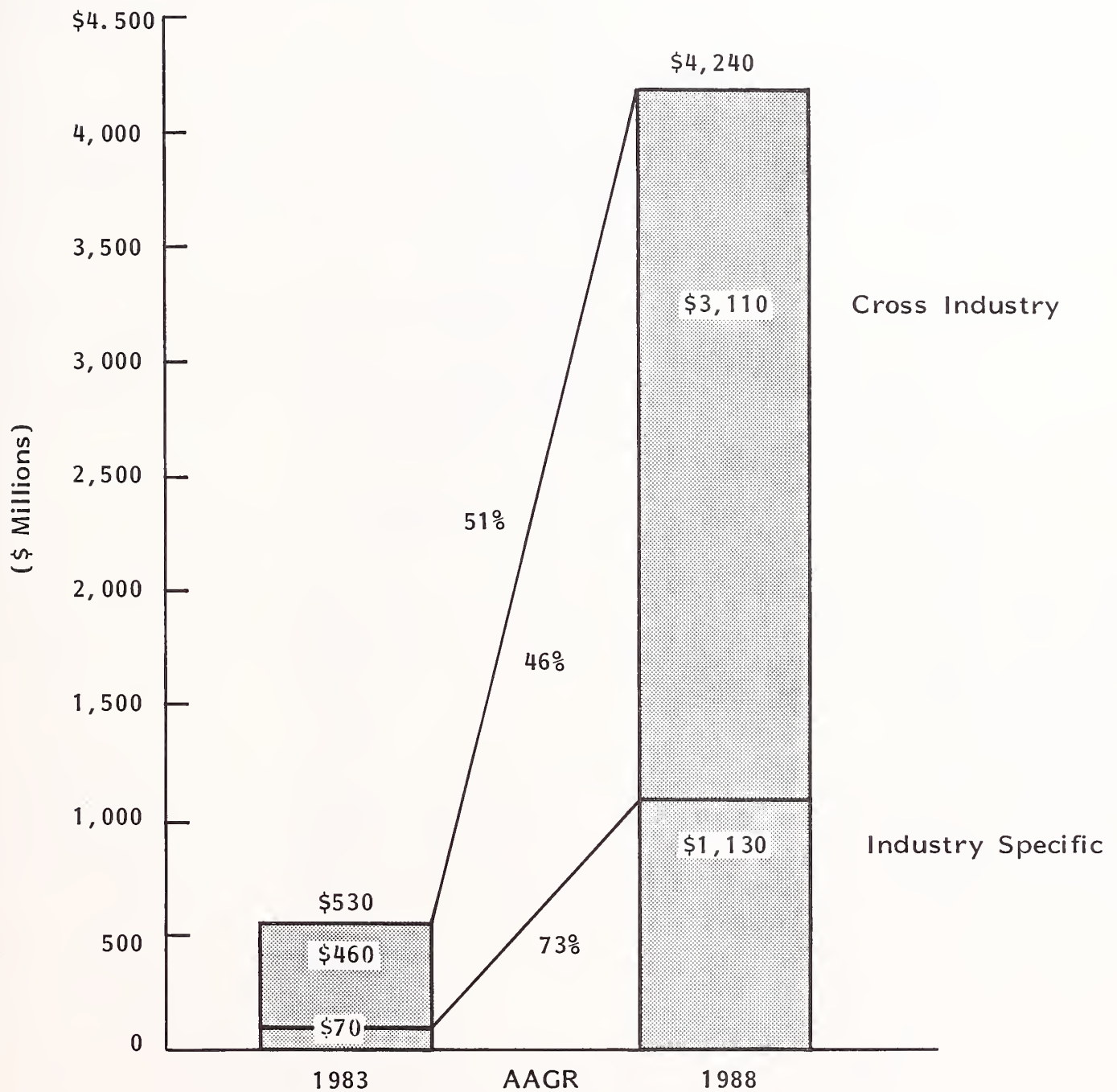
## LARGEST SOFTWARE PRODUCTS VENDORS BY NONCAPTIVE U.S. REVENUE

RANK		COMPANY	CALENDAR YEAR REVENUES (\$ millions)		1981/1982 PERCENT GROWTH
1982	1981		1982	1981	
1	1	International Business Machines Corporation (IBM)	\$1,020	\$815	25%
2	2	Digital Equipment Corporation (DEC)	134	100	34
3	3	Sperry Corporation	75	67	12
4	4	Management Science America, Inc.	73	57	29
5	10	Tandy Corporation	67	36	86
6	5	Burroughs Corporation	62	57	10
7	7	Control Data Corporation (CDC)	55	50	10
8	8	Honeywell, Inc.	55	50	10
9	12	Apple Computer	51	34	50
10	9	Informatics General Corp.	50	38	31
11	13	Cullinet Software	49	32	53
12	10	University Computing (WYLY)	49	37	33
13	11	Hewlett-Packard Corporation	43	34	25
14	15	Applied Data Research	40	30	35
15	19	Anacomp, Inc.	33	24	38

NOTE: Growth rates are rounded and are based on revenues rounded to the nearest thousand; revenues shown are rounded to the nearest million.

EXHIBIT IV-6

PERSONAL COMPUTER APPLICATIONS SOFTWARE MARKETS  
1983-1988



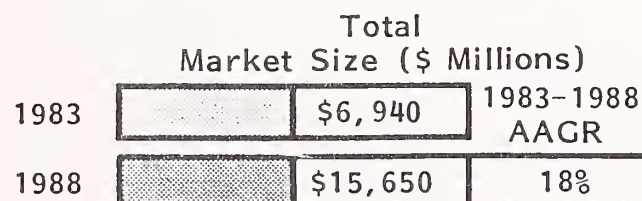
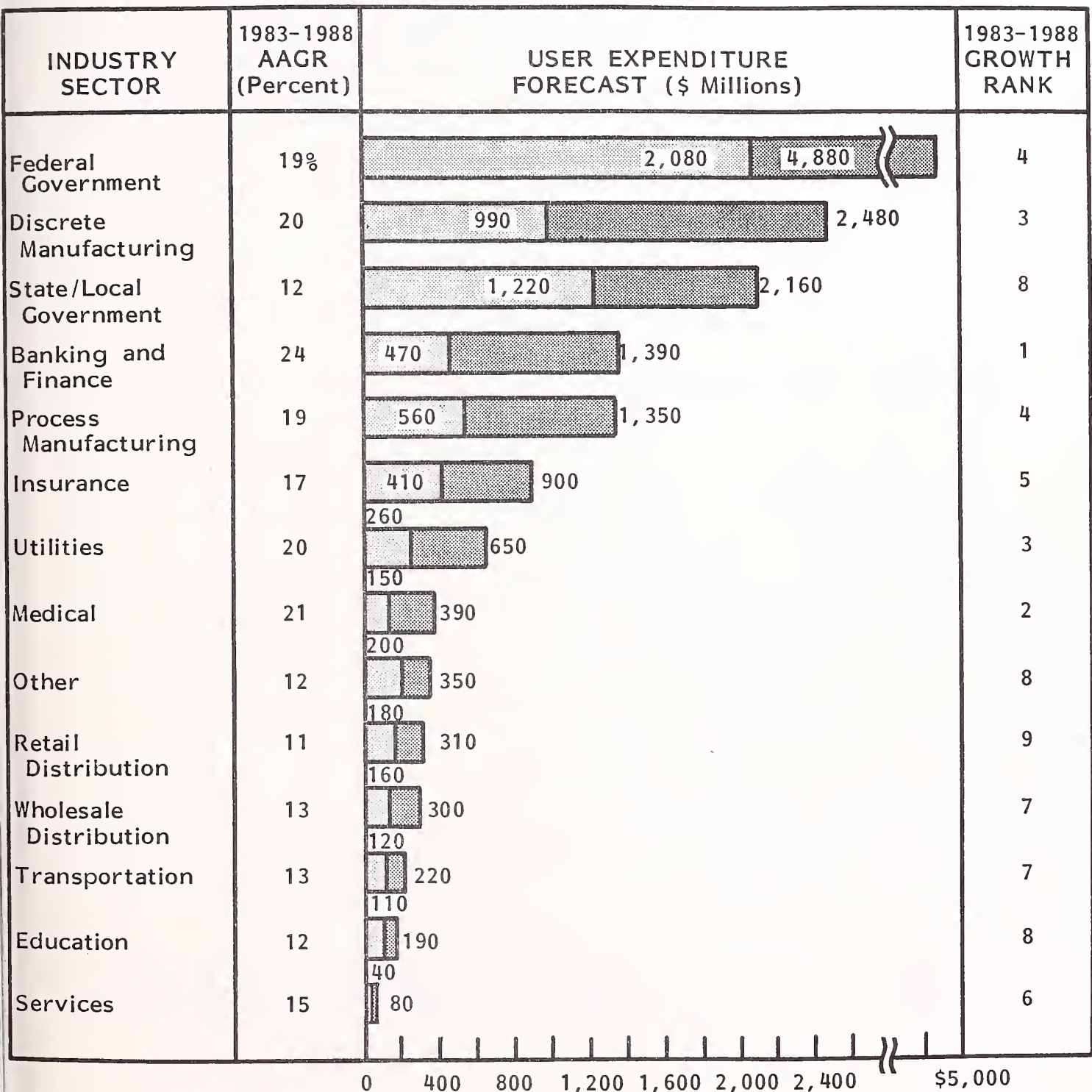
- Increased horsepower in PC-based systems will present greater opportunities to package subsets or to package function-reduced applications for sale to numerically greater markets.
- It is likely that within two to three years, the largest independent software vendors will be those serving the personal computer marketplace.

c. Professional Services

- The federal government is easily the largest industry market for professional services, accounting for \$2.08 billion in sales, 30% of the entire \$6.95 billion market.
- At a higher than average growth rate of 19% yearly through 1988, the federal government will demand \$4.88 billion worth of professional services. The market as a whole will have expanded at an 18% annual rate to \$15.65 billion. Details are in Exhibit IV-7.
- Banking and finance is the fastest growing industry market, at 24% AAGR.
- Retail distribution, in addition to being a small market, will experience the slowest growth in demand for professional services, 11% per year through 1988.
- The ranks of the largest professional services vendors are populated by a coterie of disparate companies, from hardware manufacturers and accounting firms, to subsidiaries of aerospace giants, and, of course, information services firms. The specifics are in Exhibit IV-8.



EXHIBIT IV-7  
PROFESSIONAL SERVICES MARKETS  
RANKED BY 1988 SIZE



## LARGEST PROFESSIONAL SERVICES VENDORS BY NONCAPTIVE U.S. REVENUE

RANK		COMPANY	CALENDAR YEAR REVENUES (\$ millions)		1981/1982 PERCENT GROWTH
1982	1981		1982	1981	
1	1	Computer Sciences Corporation (CSC)	\$420	\$389	8%
2	2	Electronic Data Systems Corporation (EDS)	250	206	21
3	3	Burroughs Corporation	232	198	17
4	5	International Business Machines Corporation (IBM)	195	170	15
5	4	Arthur Andersen and Company	187	165	13
6	6	Mitre Corporation	175	151	16
7	7	Price Waterhouse	147	138	7
8	8	Planning Research Corporation (PRC)	116	98	18
9	9	Peat, Marwick and Mitchell	92	84	9
10	16	CACI, Inc.	81	49	66
11	10	Control Data Corporation (CDC)	80	80	0
12	12	General Electric Company (GE)	72	56	29
13	35	McDonnell Douglas Automation Company (McAUTO)	70	21	233
14	11	Grumman Data Systems	65	59	10
15	13	Syscon	63	54	17

NOTE: Growth rates are rounded and are based on revenues rounded to the nearest thousand; revenues shown are rounded to the nearest million.



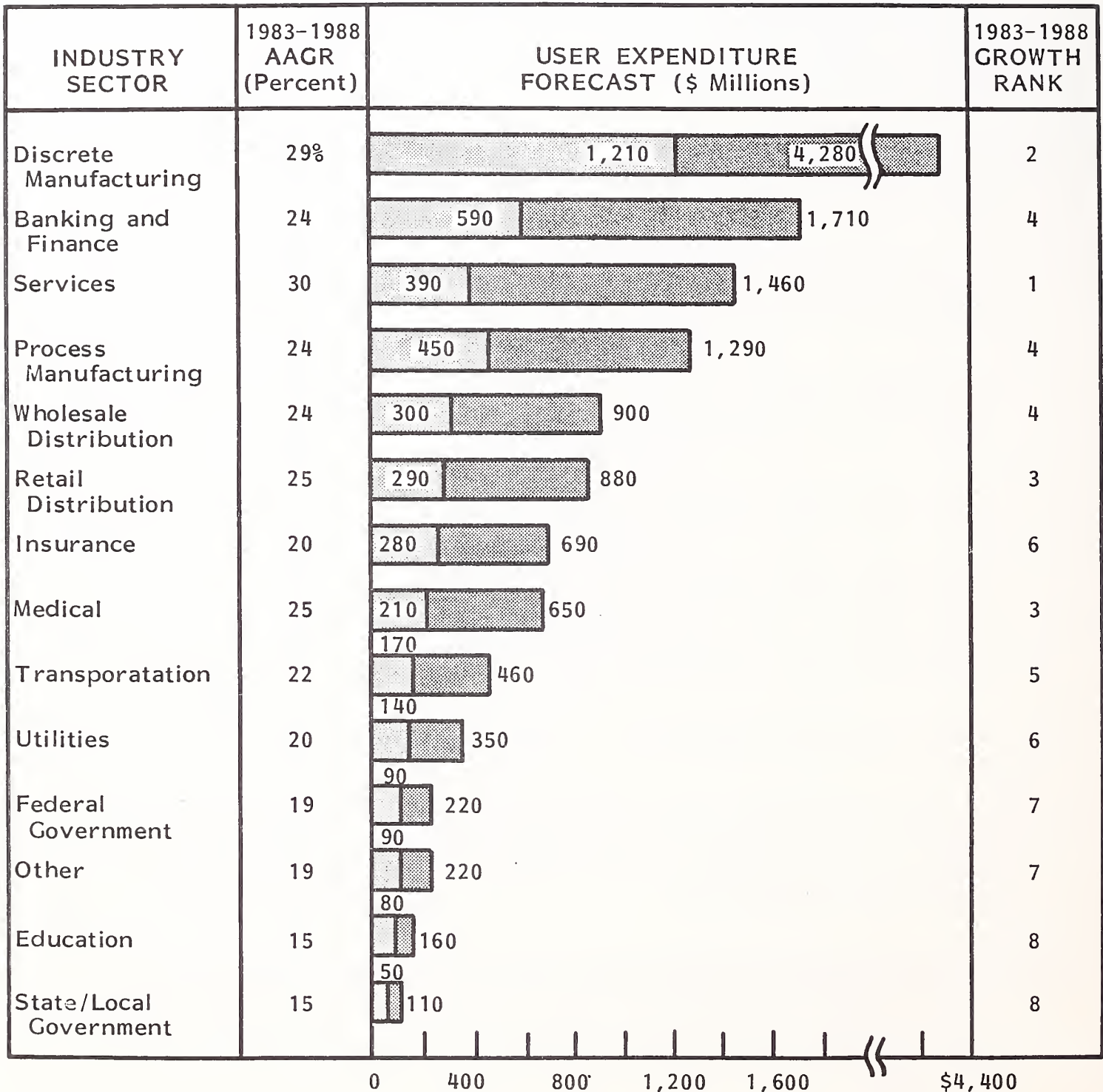
d. Integrated Systems

- This market is slated for bouyant growth over the next five years, from \$4.34 billion in 1983 to \$13.36 in 1988. This represents a 25% average annual growth rate. For details see Exhibit IV-9.
- Services will represent the fastest growing industry market for integrated systems over this period.
- Even the slowest growing sectors, education and state/local government, will advance by 15% per year, almost five times the expected increase in the GNP.
- CAD/CAM vendors are heavily represented among the largest integrated-systems firms. Specifics are in Exhibit IV-10.
- Most of the largest vendors sell industry-specific products.
- Metier Management Systems is a notable exception. Metier has achieved stellar growth recently by marketing a project evaluation/planning/and management system to a variety of industries.

2. CROSS-INDUSTRY OVERVIEW

- The total information services market will grow from a 1983 base of \$31.6 billion to a level of \$83.0 billion in 1988, an average annual growth rate of 21%, as shown in Exhibit IV-11.
- The cross-industry portion of this market will grow from \$13 billion in 1983 (36% of the total market) to \$34 billion by 1988 (40% of the market). Cross-industry applications will grow at a 21% average annual growth rate during this period.

EXHIBIT IV-9  
INTEGRATED SYSTEMS MARKETS  
RANKED BY 1988 SIZE



Total Market Size (\$ Millions)		
1983	\$4,340	1983-1988 AAGR
1988	\$13,360	25%

## EXHIBIT IV-10

## LARGEST INTEGRATED SYSTEMS VENDORS BY NONCAPTIVE U.S. REVENUE

RANK		COMPANY	CALENDAR YEAR REVENUES (\$ millions)		1981/1982 PERCENT GROWTH
1982	1981		1982	1981	
1	1	Computervision	\$203	\$164	24%
2	2	General Electric Company	108	86	25
3	6	Intergraph Corporation	93	60	55
4	3	Triad Systems	90	79	15
5	5	Gerber Scientific, Inc.	73	60	21
6	4	Schlumberger, LTD.	70	72	(4)
7	7	Computer Consoles	63	51	25
8	10	HBO and Company	52	37	41
9	13	McDonnell Douglas Automation Company (McAUTO)	50	27	81
10	8	Reynolds and Reynolds Company (The)	47	40	18
11	12	Control Data Corporation	42	30	40
12	9	Autotrol Technology	39	40	(2)
13	11	C3	38	33	16
14	29	Metier Management Systems, Inc.	27	12	131
15	14	Automatic Data Processing, Inc. (ADP)	26	21	24

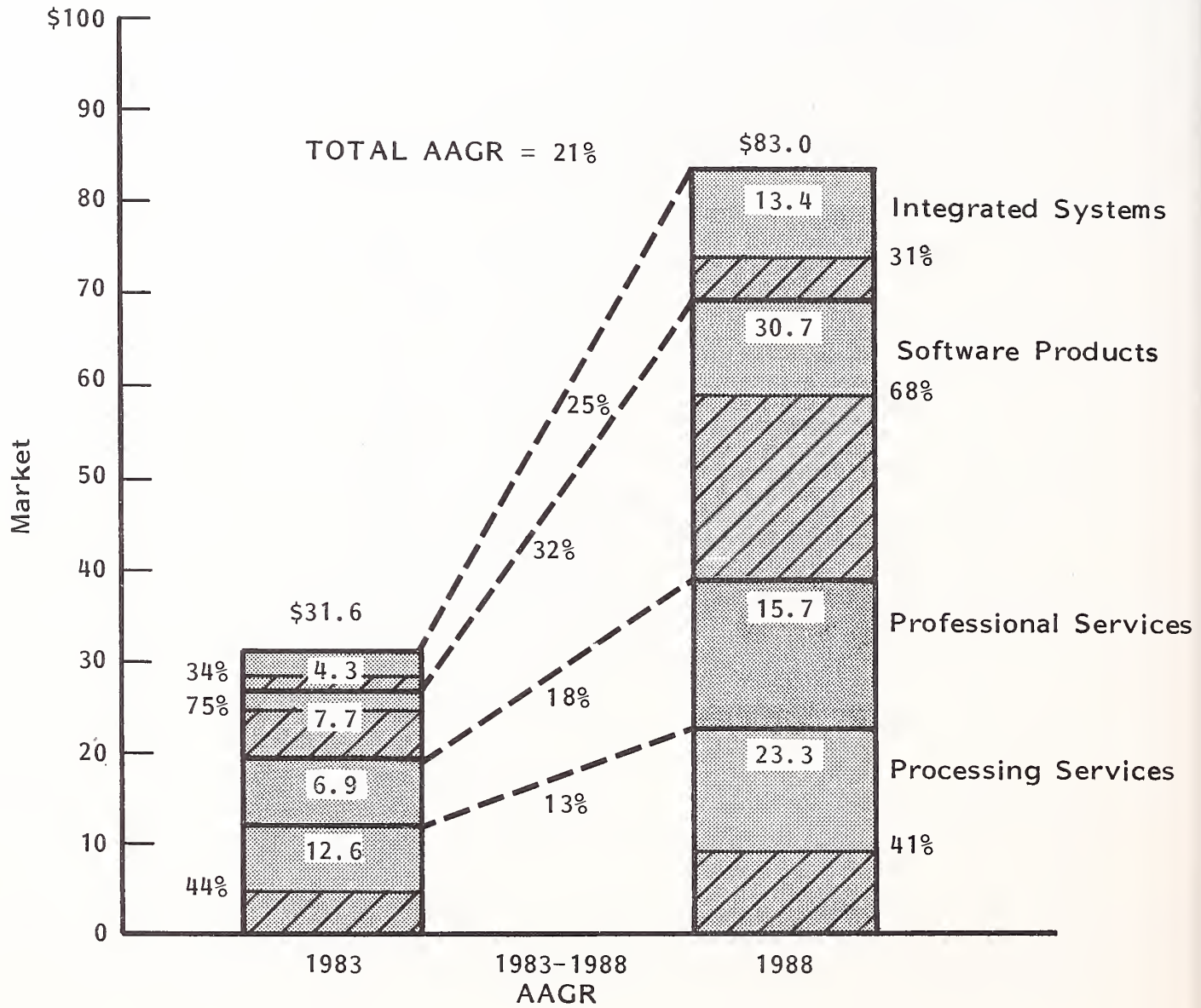
NOTE: Growth rates are rounded and are based on revenues rounded to the nearest thousand; revenues shown are rounded to the nearest million.

# EXHIBIT IV-11

## INFORMATION SERVICES MARKET

1983-1988

(\$ Billions)

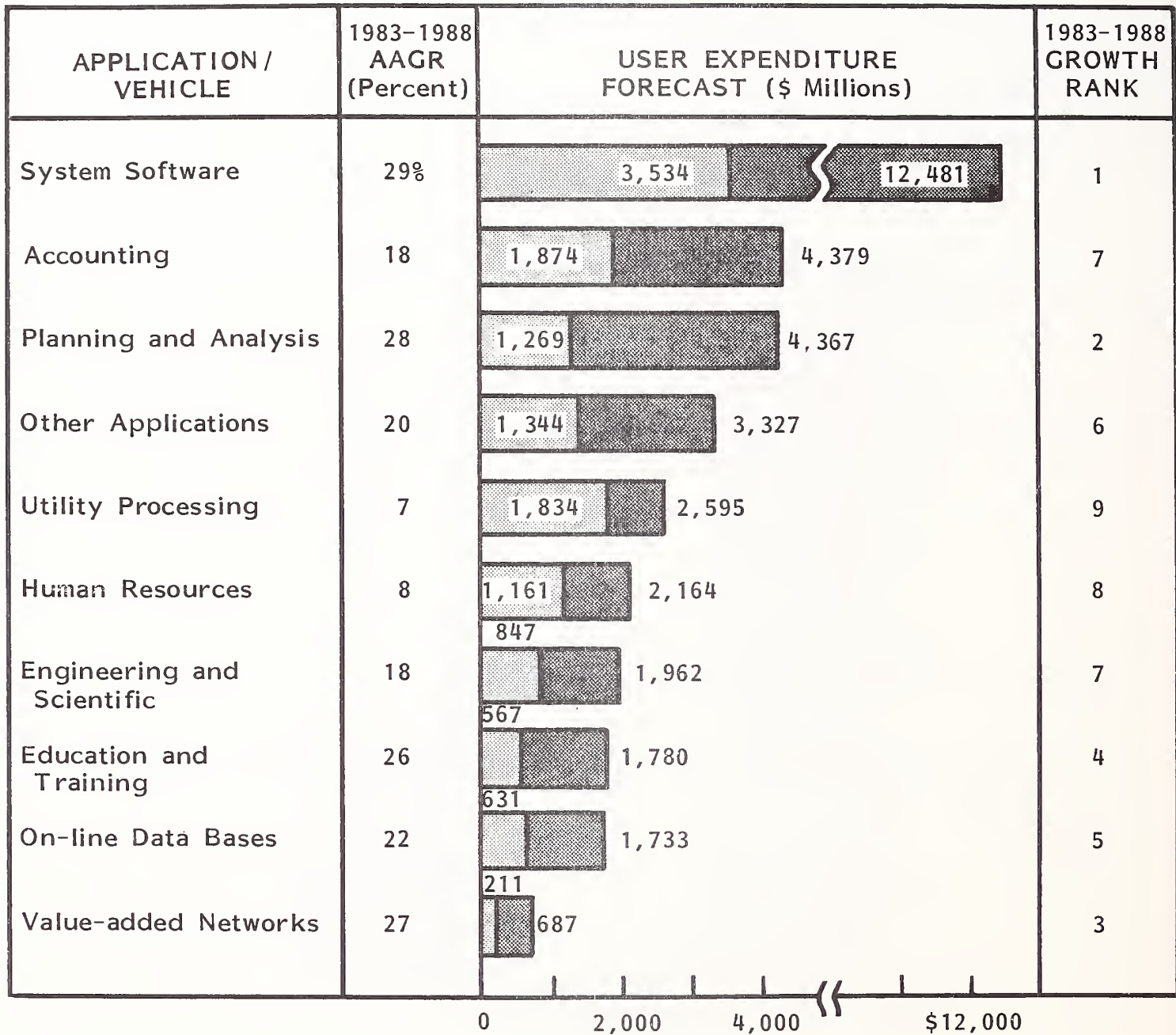


 Cross-Industry Portion of Delivery Mode



- The penetration of cross-industry applications varies significantly by delivery mode. In 1983 cross-industry applications vary from 34% of the integrated systems market to 75% of software products expenditures. Professional services are not considered in these terms because of their predominant "company specific" nature.
- The 10 market sectors within the cross-industry marketplace are shown in Exhibit IV-12.
  - Two out of the top three largest market sectors also have the two largest five-year growth rates (systems software with 29% and planning/analysis with 28%).
  - Several market sectors are coming on strong even though their size is low on the cross-industry rankings. Value-added networks, education/training, and on-line data bases are the three smallest sectors, yet their growth rates rank third, fourth, and fifth among the cross-industry markets.
  - Generally speaking, sectors that provide tools, rather than transaction-oriented solutions, are growing the fastest.
- Rankings of the cross-industry market by delivery mode size is shown in Exhibit IV-13.
  - Remote computing services is by far the largest mode in 1983, with \$2.4 billion in expenditures. However, by 1988, RCS's lead will almost be overtaken by applications software products for mainframes and minicomputers, which has a 24% AAGR.
  - The range of growth rates among the delivery modes is extremely wide, with personal (micro) computer-based applications software products ranking first with 46% AAGR, and batch processing ranking last with a 3% growth rate.

EXHIBIT IV-12  
CROSS-INDUSTRY MARKETS  
RANKED BY 1988 SIZE

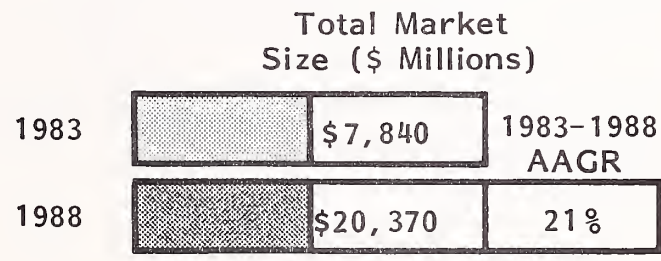
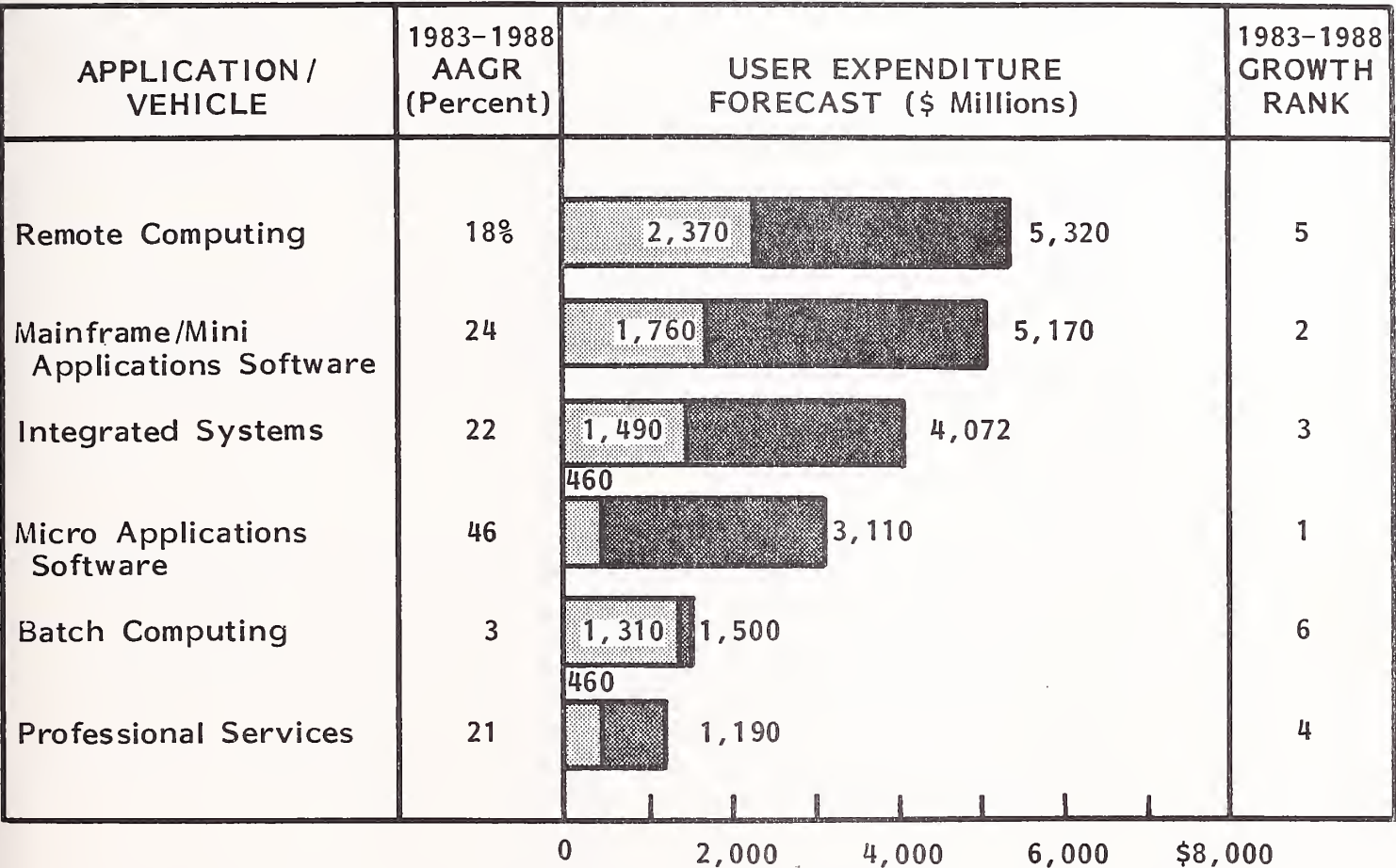


Total Market  
Size (\$ Millions)

1983	\$13,272	1983-1988 AAGR
1988	\$35,475	22%



EXHIBIT IV-13  
TOTAL CROSS-INDUSTRY APPLICATIONS MARKETS  
BY DELIVERY MODE  
RANKED BY 1988 SIZE



- The attractiveness of cross-industry sectors within each delivery mode also shows much variability. As seen in Exhibit IV-14, sectors encompassing RCS range from a 27% AAGR for value-added networks to 9% AAGR for accounting.
- Similarly, the difference in market size varies 17-fold, from education and training at a 1988 size of \$110 million, to on-line data bases with a market of \$1.7 billion by 1988.
  - Exhibit IV-15 shows sector size and growth for mainframe/minicomputer applications software products. Here we see that the two largest sectors (accounting and planning/analysis) also are showing some of the best growth rates (22% and 33% respectively).
  - Exhibit IV-16 profiles the cross-industry sectors for the top-ranked delivery mode (in terms of five-year growth): micro applications software products. The fastest growing sector in the entire cross-industry market is education and training that is related to personal computers. Its average annual growth rate is an impressive 63% for the five-year period.
- In order to provide a roadmap to subsequent chapters that discuss cross-industry markets in more detail, Exhibit IV-17 outlines the structure of the software products marketplace and provides examples of the types of applications contained in each category.

EXHIBIT IV-14  
 REMOTE COMPUTING SERVICES CROSS-INDUSTRY APPLICATIONS MARKETS  
 RANKED BY 1988 SIZE

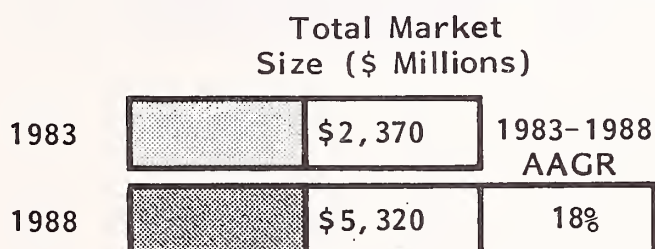
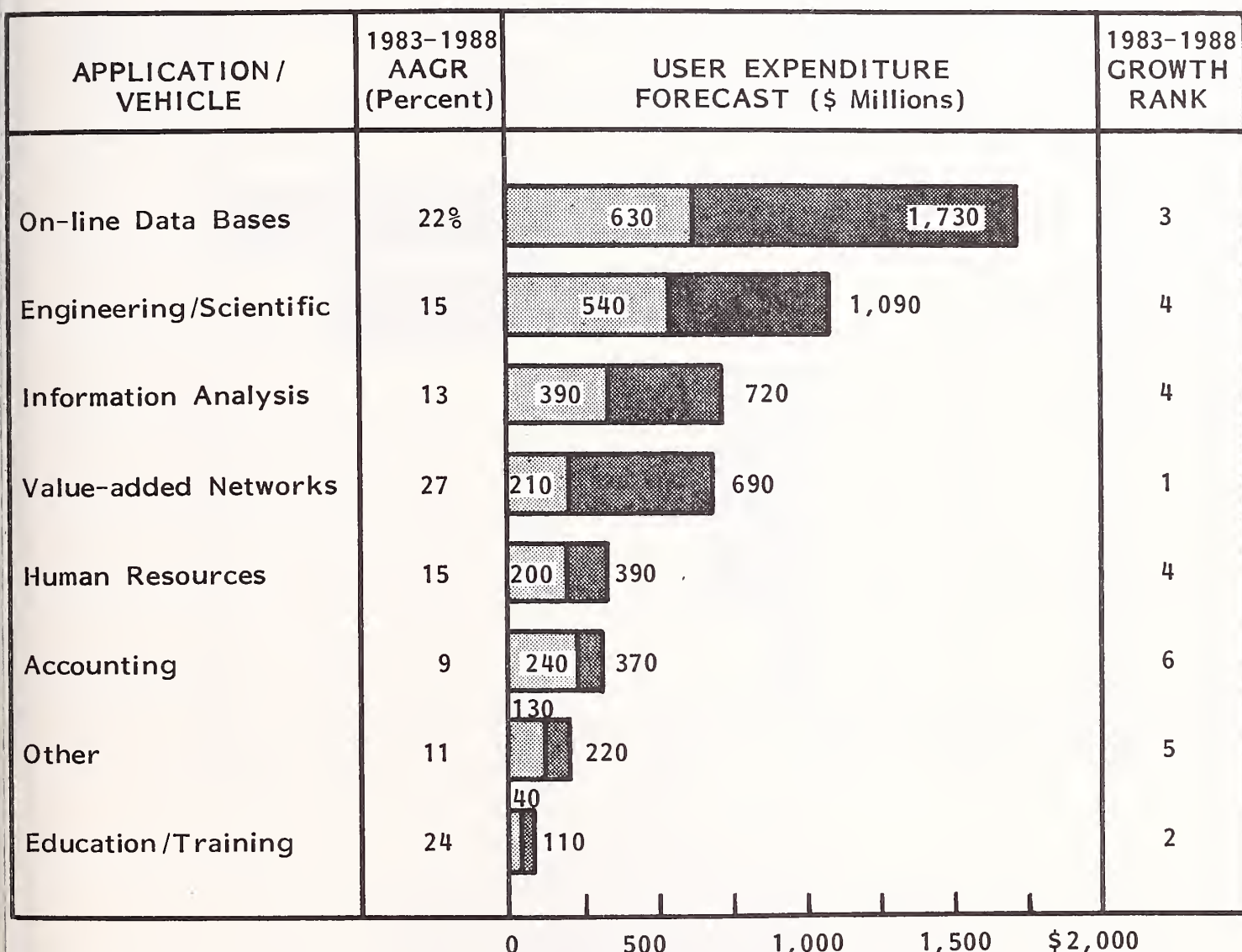




EXHIBIT IV-15  
MAINFRAME/MINI APPLICATION SOFTWARE CROSS-INDUSTRY MARKETS  
RANKED BY 1988 SIZE

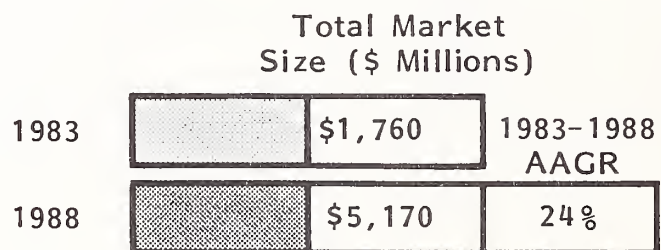
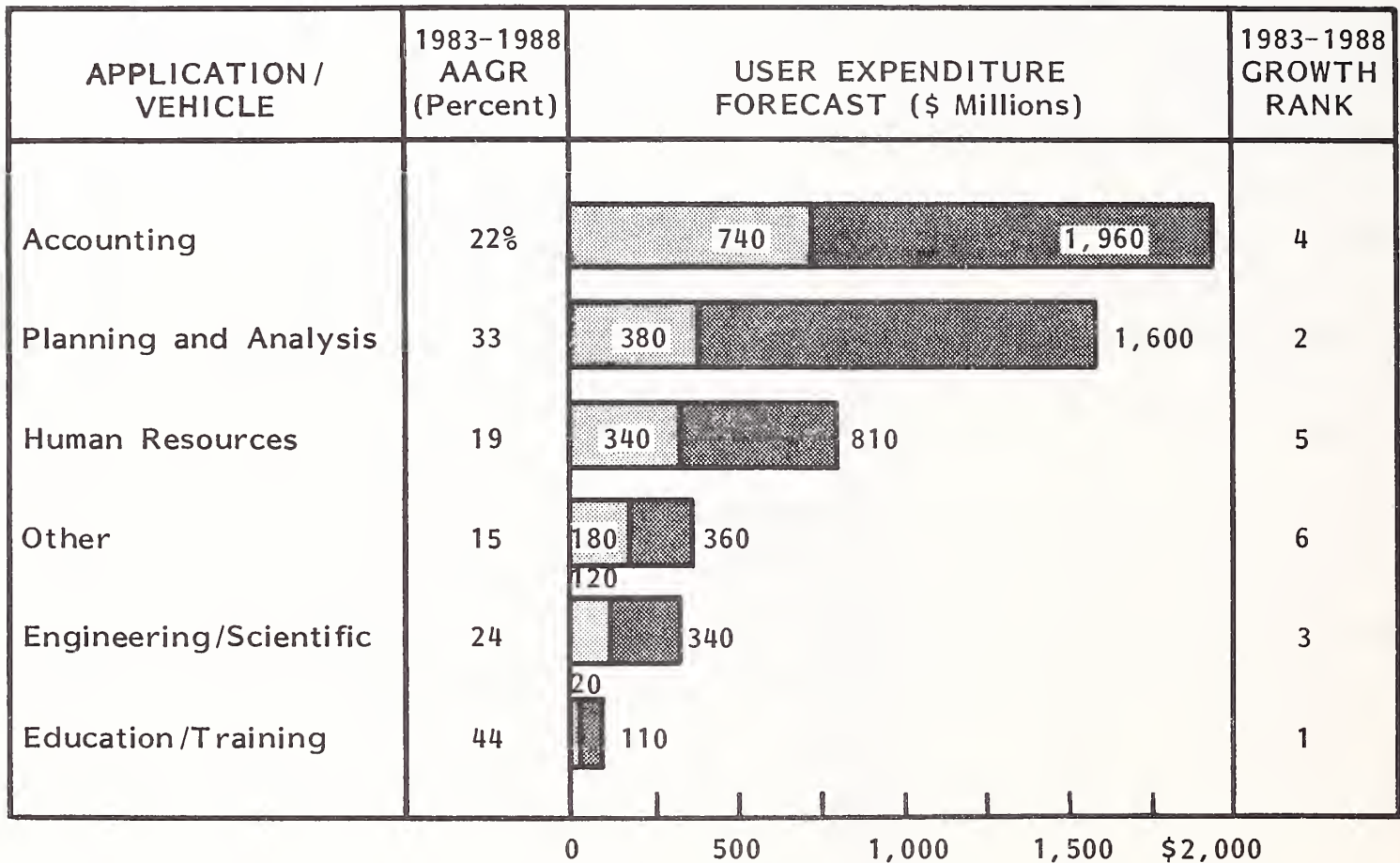
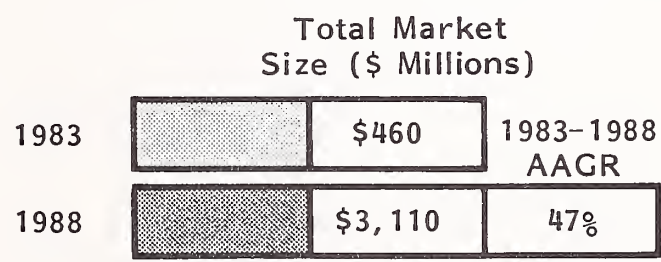
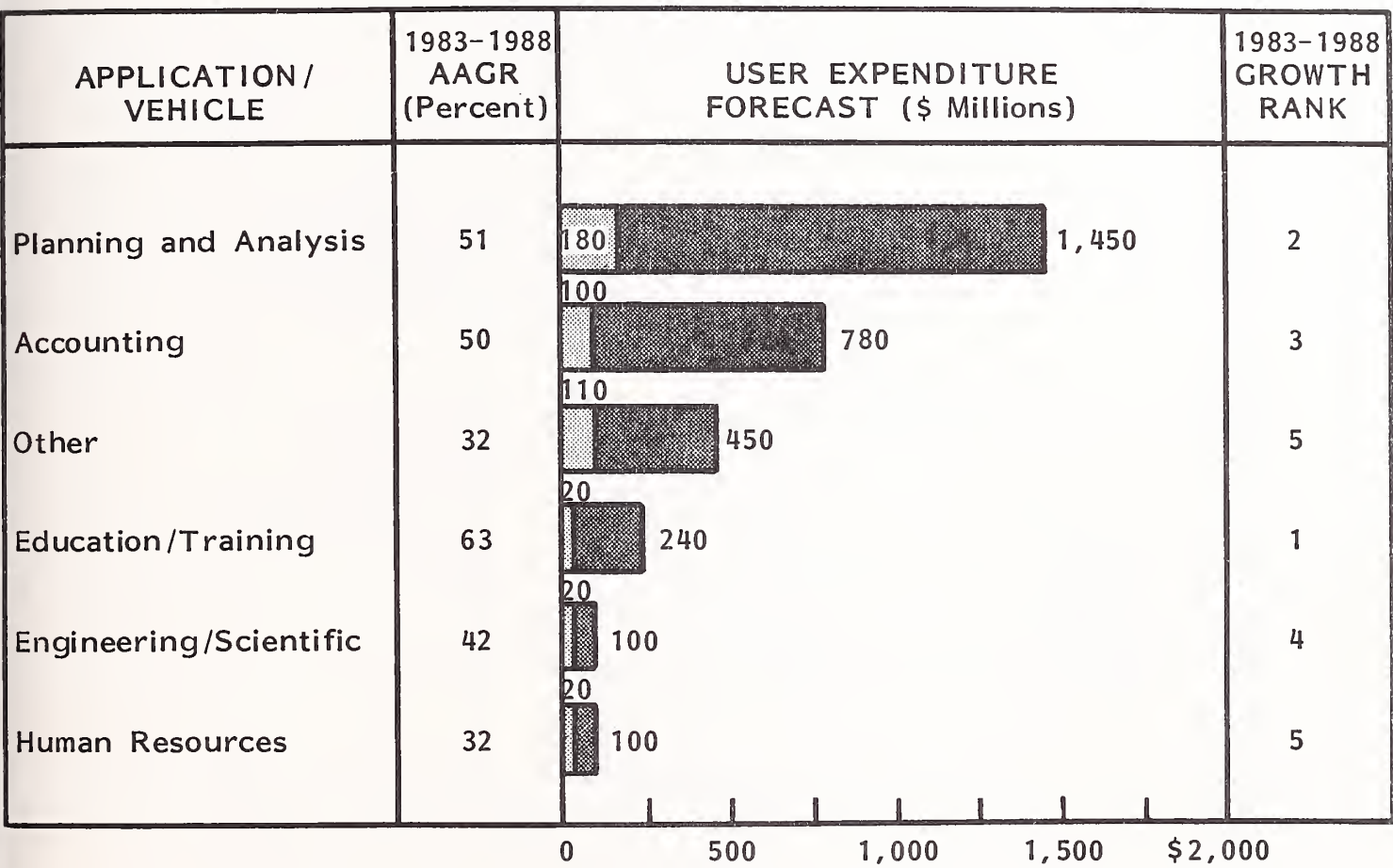
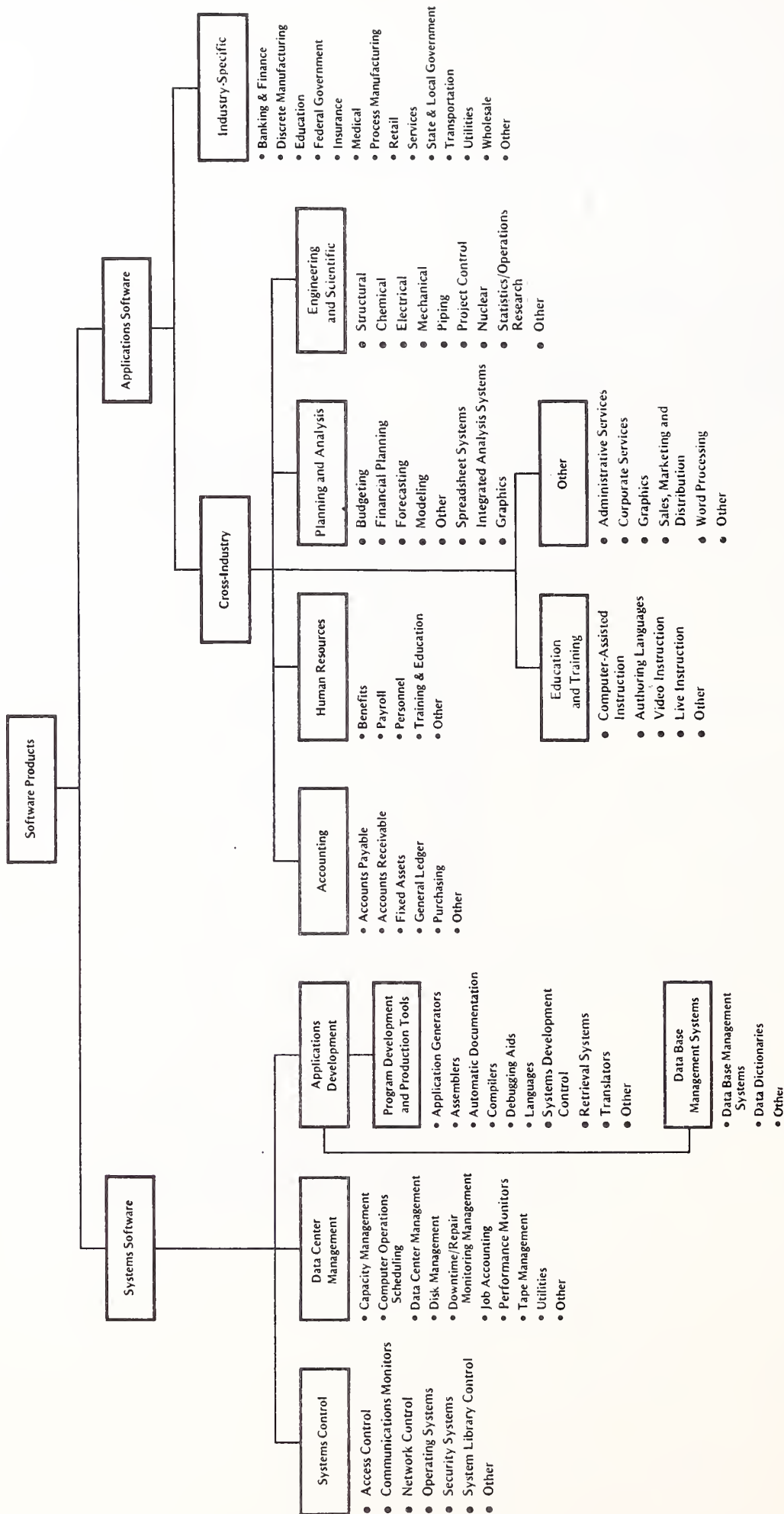


EXHIBIT IV-16  
MICRO APPLICATIONS SOFTWARE CROSS-INDUSTRY MARKETS  
RANKED BY 1988 SIZE



## SOFTWARE PRODUCTS MARKET STRUCTURE





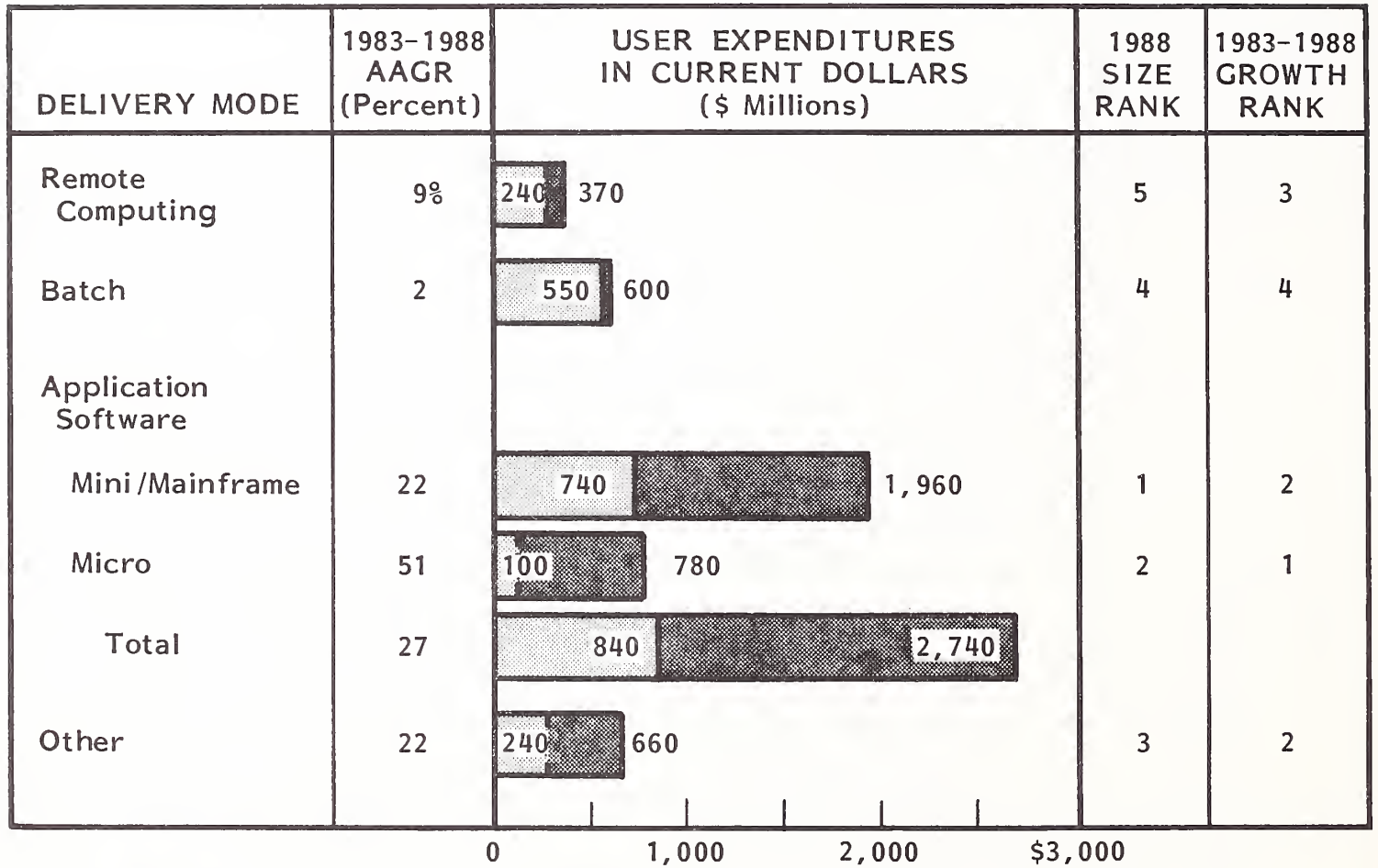
## **B. ACCOUNTING MARKET**

### **I. MARKET SIZE AND GROWTH**

- The largest as well as the fastest growing delivery mode in cross-industry accounting is applications software, as shown in Exhibit IV-18.
  - Many of the largest independent companies, such as MSA, McCormack & Dodge, Software International, and University Computing Company, offer cross-industry accounting applications.
    - All four of these firms or their affiliates offer PC software or a software link to PCs.
    - McCormack & Dodge, and Software International both maintain an independent presence in the industry, although they have been acquired respectively by Dun & Bradstreet and GEISCO.
- One of the factors promoting the growth of accounting software is the interest in using financial modeling and decision support systems. These systems require that accounting data be systematically developed.
- Other factors include the continued trend toward deregulation and acquisition and divestiture activity.
- There is also a greater use of accounting detail in day-to-day business activity.
  - Managers are rewarded for delaying costs and accelerating payments. Timely accounting reports are necessary to track this activity.

# EXHIBIT IV-18

## CROSS-INDUSTRY APPLICATIONS MARKETS FORECAST ACCOUNTING APPLICATIONS, 1983-1988



Total Expenditures

1983		\$1,870 million
1988		\$4,380 million

AAGR = 18%

- Accounting detail is also used to support daily decisions on credit, purchases, workload, and personnel decisions.
- Remote processing of accounting work will grow at one-third the rate of software products sold for accounting, as also shown in Exhibit IV-18.
- The ability to use data communications, graphics, a modeling or DSS package, or data base capabilities at a vendor provides the impetus to use RCS processing for accounting work in some cases.

## 2. ISSUES AND TRENDS

- Interfaces between mainframe systems and systems that run on mini and personal computers are proliferating.
  - These interfaces are important for successful corporationwide accounting. Without them, redundant accounting files and problems with data integrity are apt to develop.
  - The interfaces also allow users with spreadsheet or financial modeling software packages to utilize corporate financial data.
  - Informatics and VisiCorp have highlighted the development of their interface, VisiAnswer.
- The need for financial detail to feed analytical systems will be felt increasingly over the coming years.
  - The need to record data and indicative codes for all revenue and costs will increase pressure to use automated general ledger, accounts receivable, accounts payable, payroll, and other accounting systems.

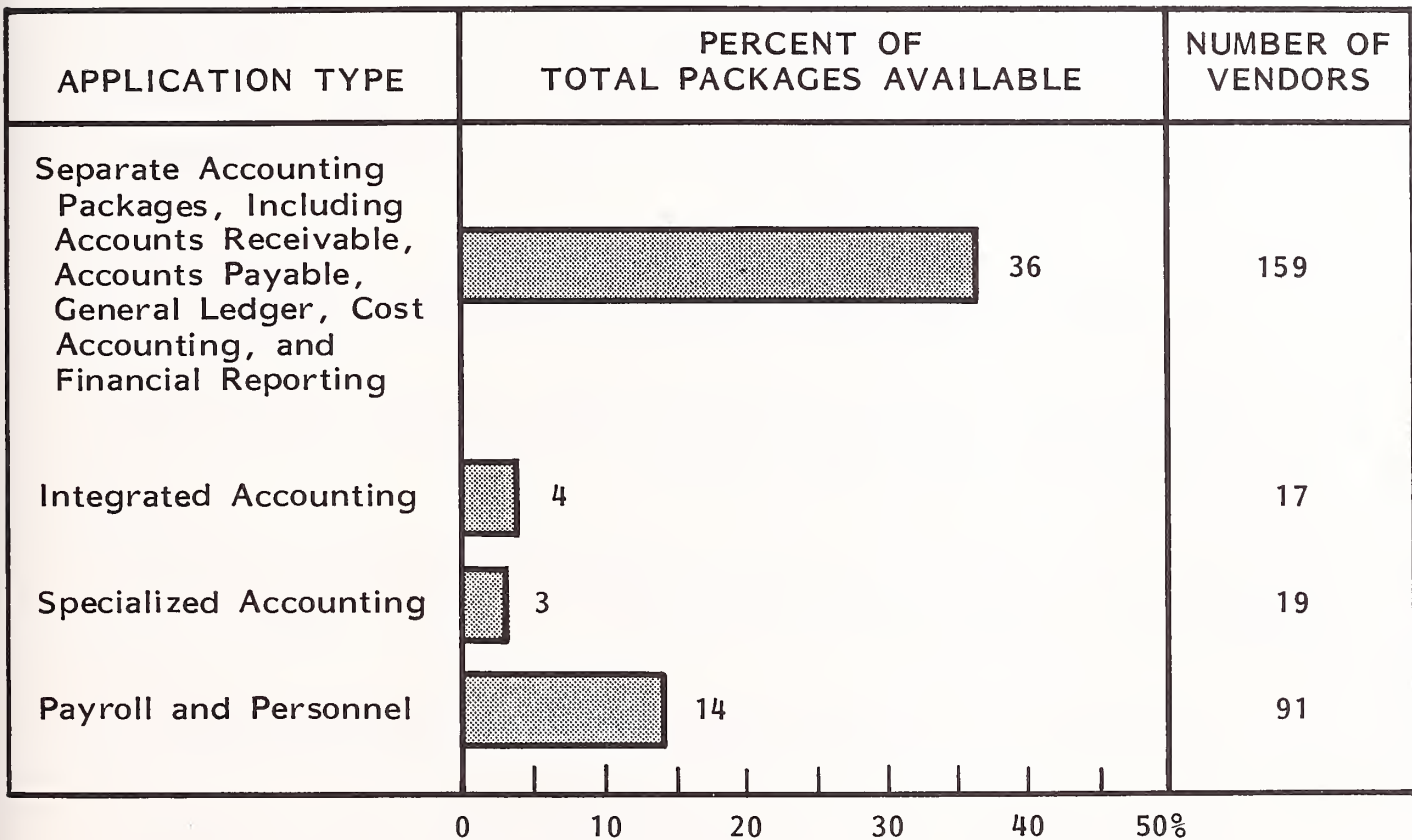
- The need to relate financial data for analytical purposes will promote the use of integrated accounting systems and DBMS.
- Although there are fewer integrated accounting systems than separate accounting applications, as shown in Exhibit IV-19, there is a trend toward the use of integrated accounting.

### 3. COMPETITIVE ANALYSIS

- RCS vendors are experiencing a significant turnover of customers.
  - Many firms that are using RCS for accounting applications are moving in-house.
  - New customers will continue to be found, however.
    - Some new customers will be smaller firms wanting to automate manual systems.
    - Other new customers will be firms planning to use DBMS, data communications, graphics, or other capabilities in combination with accounting packages. Companies who want to aggregate data from several operations into reports (some using graphics) have found RCS to be an expedient service.
- Most major vendors of RCS (including GEISCO, Dun & Bradstreet, ADP, and Tymshare, as well as many smaller firms) offer accounting software directly or through subsidiaries.
  - Many RCS firms now offer interactive processing of accounting work, providing input from work areas by means of prompts to aid in the control and editing of data input.

# EXHIBIT IV-19

## ACCOUNTING-RELATED PACKAGES AVAILABLE FOR IBM COMPUTERS





- Most RCS processing for accounting work is remote batch, however.
- A small number of major RCS firms, such as ADP and many smaller firms, offer batch processing for cross-industry accounting. A segment of this work is tied to input media, which facilitates the use of batch processing.
- Competition for accounting processing services makes use of several strategies.
  - Sales approaches (including seminars, advertising and, in some cases, sales campaigns by phone) encourage first-time users to avoid the problems of hardware and software by using accounting packages at a computer service company.
  - ADP uses radio advertising to bring attendees into these seminars.
  - Many local and regional processors use the same approach to encourage first-time users to try RCS.
- Some firms that offer RCS services are also offering integrated turnkey systems with accounting applications on PCs.
  - ADP, IBM, and GEISCO are among the firms providing such services.
  - Several of these vendors have developed strategies to offer packages of software on PCs, including accounting modules, through banks to mid-sized and smaller companies.
- Although there are hundreds of software developers and thousands of packages being offered in the marketplace, the most successful vendors of packages have been the older, more established vendors who had introduced their original packages eight or more years ago, as shown in Exhibit IV-20.

## EXHIBIT IV-20

## VENDORS OF TOP-SELLING CROSS-INDUSTRY PACKAGES

VENDOR	TOP SELLING PACKAGE	YEAR FIRST MARKETED
MSA	General Ledger	1970
United Information Systems (UIS)	Portfolio (With Integrated Accounting)	1972
Software International	General Ledger and Financial Reporting	1970
McCormack and Dodge	(General Ledger) Plus	1977
University Computing	Financial Control System	1972
Saddlebrook Corp.	Financial Planning and Control	1974
Global Software	Global General Ledger Financial Reporting System	1971
Westinghouse Information Services	Financial Accounting	1969

- The proven maturity of these systems, as demonstrated by number of users and age of system, were factors of importance.
- Three of these vendors also marketed other top-selling packages that had been introduced seven or more years ago.
- Accounting packages for mini and microcomputers are more recent, of course.
  - New firms and hardware vendors (such as IBM, NCR, Burroughs, and Nixdorf) are active in introducing such packages.
  - Firms that have marketed accounting packages for mainframes have also introduced packages for smaller computers. MSA was one of the first to do so via their acquisition of Peachtree Software, which offered PC-based software products.
  - RCS firms, such as ADP and GEISCO, also offer such packages.

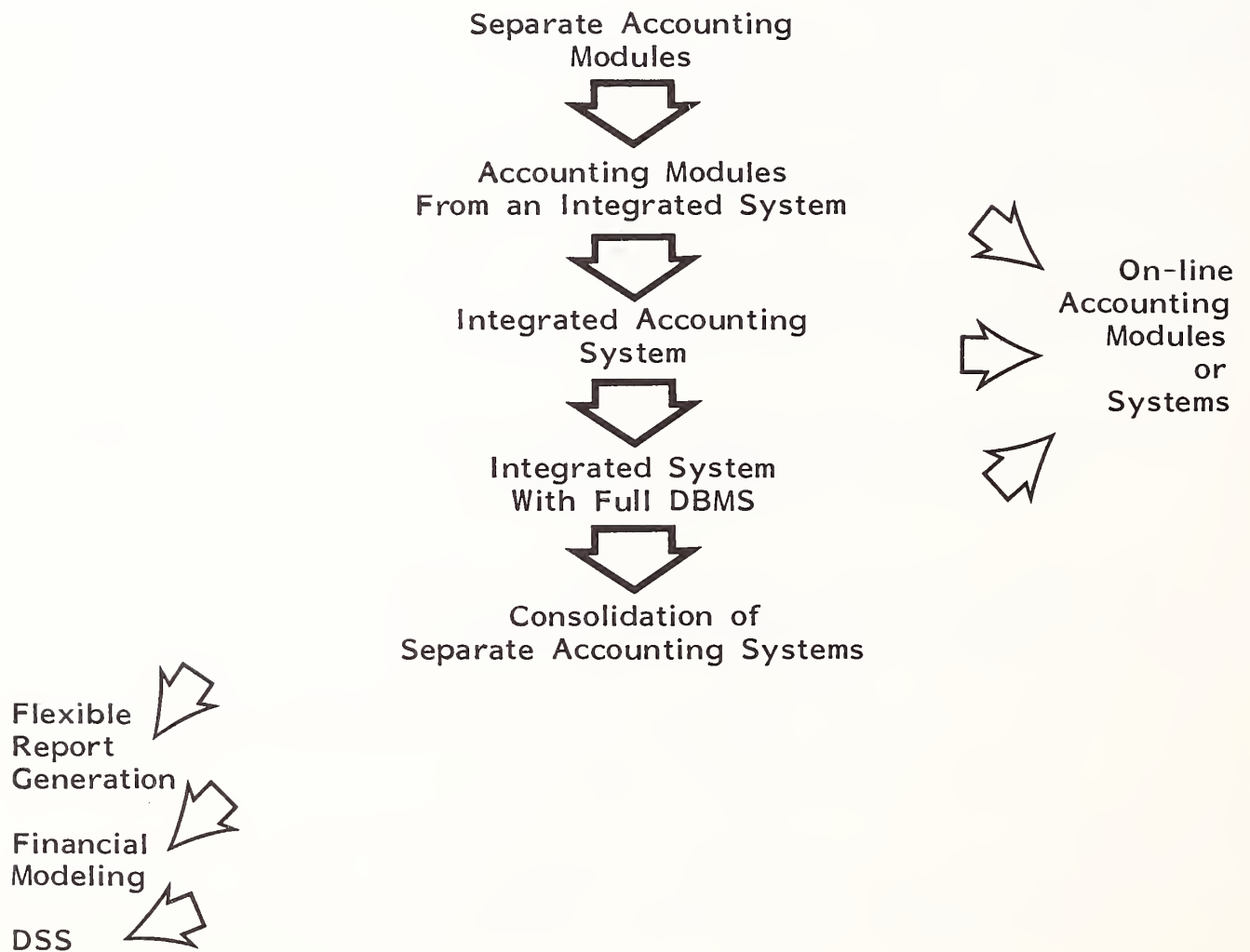
#### 4. RECOMMENDATIONS

- RCS vendors interested in cross-industry accounting applications should consider strategies to attract first-time users with straightforward or more-sophisticated applications.
  - First-time users can be attracted by a marketing approach that emphasizes the avoidance of hardware and software considerations through the use of RCS.
  - First-time users who must experiment with a series of on-line accounting modules in order to automate their accounting systems may find it easier to work with an RCS firm than implement such a system on a newly acquired computer.

- RCS vendors should consider activities in support of users who want to move in-house. By assisting users to move in-house or by supplying software or turnkey systems, RCS firms can achieve additional revenue when customers make a decision to move in-house.
- Software vendors who offer cross-industry accounting applications must consider the progression of demand that can take place in the marketplace, as shown in Exhibit IV-21.
  - There is a demand for standalone accounting modules, but many users of these modules will want to integrate them with other accounting work in the future.
  - Data base capabilities could become necessary to feed reporting or modeling needs.
  - A need for consolidation capabilities may occur after separate corporate entities automate their accounting.
- The needs of different corporations differ, however, and software vendors should be prepared to offer different sets of modules.
  - Many, but not all, corporations will be interested in on-line accounting modules to reduce input and other work.
  - Subsets of data may have to be produced from data bases or through consolidations to meet reporting or modeling needs.
- Software vendors should also anticipate the use of application generation and fourth-generation languages capabilities in accounting applications. This will allow applications to be tailored more rapidly to meet customer needs.

EXHIBIT IV-21

PROGRESSION OF ACCOUNTING NEEDS





## C. EDUCATION AND TRAINING

### 1. MARKET SIZE AND GROWTH

- INPUT estimates that by the late 1980s one of every two workers will work with a computer to do their job. With only one in five workers currently using a computer on the job, there is a major need for training. Both information systems professional training and end-user training will show significant growth (26% AAGR) during this period, with revenue more than tripling to \$1,710 million from the current \$550 million level. Details are shown in Exhibit IV-22.

### 2. ISSUES, TRENDS, AND COMPETITIVE ANALYSIS

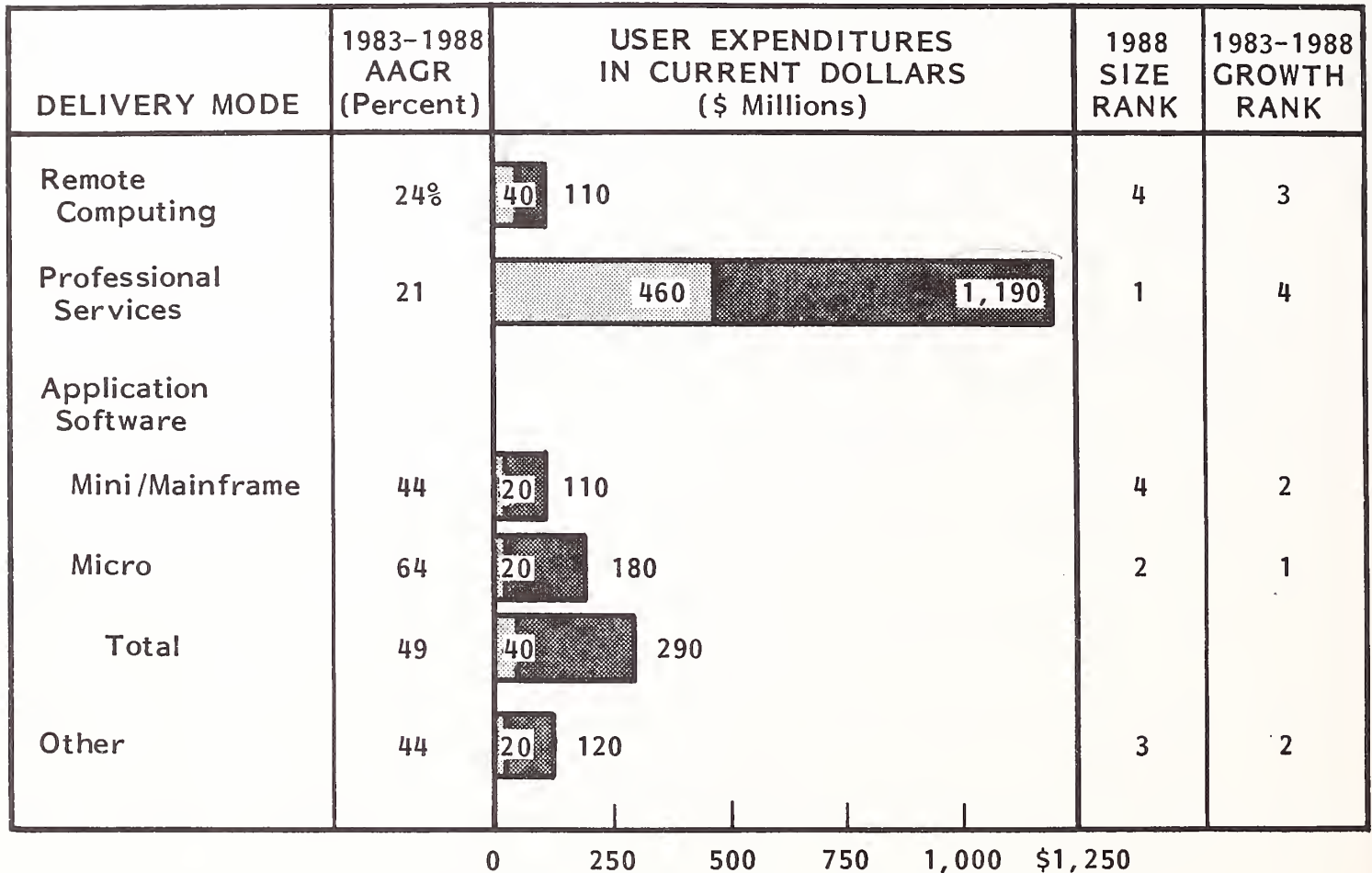
- Education and training, as a growth business of the 1980s, will come from three major modes of delivery: live instruction, video instruction, and computer-assisted instruction.

#### a. Live Instruction

- Instruction provided by instructors in classroom settings will experience the slowest growth during this period and will decrease in share of total training revenue, from the current 64% level to approximately 40%. Details are in Exhibit IV-23.
- While this type of instruction, usually provided by professional services companies, can have the smallest cost per student, it has often proven to be the least effective in terms of development and retention of technical skills. When the instruction is provided at a remote site, the additional travel costs make the cost of other instructional modes much more competitive.

# EXHIBIT IV-22

## CROSS-INDUSTRY APPLICATIONS MARKETS FORECAST EDUCATION AND TRAINING SECTOR, 1983-1988



Total Expenditures

1983		\$ 550 million
1988		\$1,710 million

AAGR = 26%

EXHIBIT IV-23

EDUCATION AND TRAINING MARKET GROWTH BY DELIVERY MODE  
1983-1988

	USER EXPENDITURES				AAGR 1983-1988
	1983		1988		
	(Percent)	(\$ Millions)	(Percent)	(\$ Millions)	
● Total Industry	100%	\$550	100%	\$1,710	26%
- Live	64	350	40	684	14
- Video and Products	78	155	20	342	17
- CAI	8	45	40	684	72
. Software	11% of CAI	5	60% of CAI	410	141
. RCS	89% of CAI	40	16% of CAI	110	24
. Integrated Systems	-	-	24% of CAI	164	-

- There is also a problem with the limited number of qualified instructors. Success in live instruction is definitely dependent on "name" instructors and their ability to "draw" an audience. There is, obviously, a limited number of such technical celebrities.
- Competition among vendors of live instruction is very diffuse, with many vendors providing only a single course or covering only a specific topic area.

b. Video Instruction

- Video instruction, as provided by companies such as Deltak, ASI, and Edutronics/McGraw-Hill, will lose market share of the total education and training market. This mode will continue to be a significant mode of instruction, however, especially for the lower level, semitechnical skills.
- It is unlikely that vendors with single video courses or vendors who acquire significant numbers of courses will seriously erode the market share of the front runners. The cost of developing courses in this medium is a major deterrent to new entrants.

c. Computer-Assisted Instruction

- By far the largest growth will be realized by vendors who use the computer to deliver or aid in the delivery of instruction. The size of this segment of education and training by 1988 will exceed the size of the total education and training market in 1983. Remote computing, integrated systems and, most notably, applications software, will capture a 40% share by 1988.
- Remote computing, among the first attempts to use the computer for instruction, has just recently begun to show a profit potential. CDC's PLATO, IBM's IAS, and the new Phoenix system are all backed by large R&D capabilities, a wide courseware distribution capability, and an ability to quickly and easily update information.

- Their plusses, however, are offset by very large instructional unit costs, a lack of quality, particularly in graphics, and the availability of only a limited number of courses.
- Major vendors will develop downloading capabilities in an attempt to capture some of the personal computer market.
- CDC has already developed an integrated delivery system for its PLATO courseware and authoring language. Integrated systems are also available from Hazeltine, Regency Systems, WICAT, and a host of other vendors. As hardware manufacturers search for niches, integrated instructional systems will undoubtedly become more popular.
- While growth will be strong in this delivery mode, there is the real concern that a dedicated system duplicates other multi-purpose hardware, especially microcomputers, that are coming into place. There will be some resistance to a two-machine approach.
- However, in spite of these impediments, PC applications software will be the hottest growth area in this sector. Factors stimulating the market include the availability of PCs in large numbers, the DC's familiarity to the user, and a tremendous need for hands-on training. Interactive video instruction will be among the fastest growing technologies.
- The liabilities with PC applications software for training and education include:
  - Limited capacity of the hardware.
  - Quality of the contents.
  - Availability of good instructional designers.



- Amount of competition.
- Indicative of the increasing interest in this market area is MSA's recent purchase of Eduware, a \$1 million firm specializing in educational software for PCs.

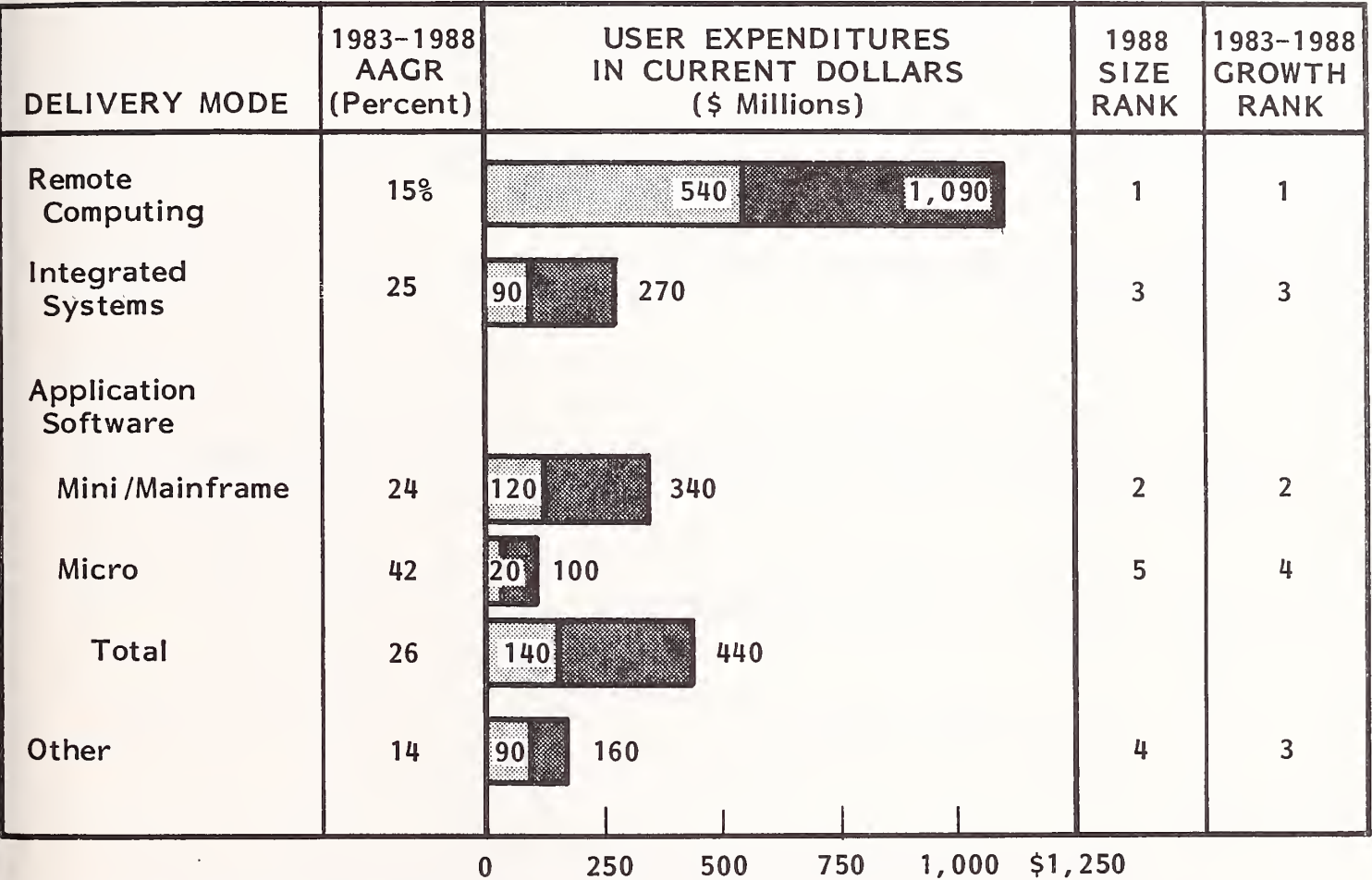
#### D. THE ENGINEERING AND SCIENTIFIC MARKET

##### I. MARKET SIZE AND GROWTH

- Engineering and scientific problems are solved through the application of all information system delivery modes. The overall market will grow from \$850 million in 1983 to 2.0 billion by 1988, an AAGR of 18% as shown in Exhibit IV-24.
  - Remote computing services have maintained their strength in this market - more so than in most other application areas.
  - Professional services support of Department of Defense and NASA projects involving engineering analysis has increased.
  - Software product vendors have found engineering applications addressing market niches that can be dominated.
  - Integrated systems for CAD/CAM have dominated this sector.
- The engineering and scientific market is typified by a number of factors including:
  - Work that is project oriented and nonrepetitive.

# EXHIBIT IV-24

## CROSS-INDUSTRY APPLICATIONS MARKETS FORECAST ENGINEERING AND SCIENTIFIC SECTOR, 1983-1988



Total Expenditures

1983		\$ 850 million
1988		\$1,960 million

AAGR = 18%

- Work that involves the solution of mathematical problems and, as such, has high requirements for computer power and relatively low requirements for I/O.
  - Work that is often mixed mode, requiring both interactive and remote batch processing.
  - Work that spans all industry segments, yet is concentrated in manufacturing, both discrete and process.
  - Work in which graphics can play a key role.
- The environmental forces in the scientific and engineering marketplace are many and include:
    - The reindustrialization of American factories, which, on the heels of a severe recession, will increase demand for engineering applications.
    - The Reagan administration will continue to fund DOD expenditures, and engineering and scientific (E&S) applications.
    - The continued exploration and development of alternative energy sources will result in increased engineering processing.
    - R&D budgets will be increased to meet foreign competition in traditional U.S. markets (e.g., automobiles, consumer and industrial electronics, and computers/peripherals).
    - The rapidly expanding use of CAD will improve productivity, product quality, and reliability.
  - The driving forces within E&S applications include:

- An increasing user demand for on-line access to corporate data, including engineering design, manufacturing, and quality assurance data.
- An increasing "in-house" backlog for new and enhanced engineering applications software.
- The installation of in-house DBMSs that are providing the "source" data for information analysis.
- In-house computer services that are, to a large extent, constrained to maintain and enhance batch software systems.
- A proliferation of minis, super minis, micros, and integrated systems.

## 2. DOMINANT PRODUCT TRENDS

- RCS vendors will continue to seek exclusive marketing rights from software suppliers.
- The engineering workstation will become the dominant hardware product and will be characterized by:
  - 32-bit processing power.
  - Support of IGES and GKS interface standards.
  - Host processor communications.
  - Local, specialized application features.
- The engineering workstation will be marketed by integrated systems and RCS vendors.

- Software vendors will work to bring data base systems and techniques to engineering applications.
- Engineering design analysis systems will continue to dominate the E&S market.
- Design analysis for all disciplines, including structural, process, and civil, will be involved.
- In-house competitive pressure will continue to drive E&S vendors into industry specialization.
- RCS marketing strategies will be dependent upon access to large, scientific mainframes and engineering workstations.

### 3. DOMINANT SUPPORT TRENDS

- The industry has suffered from a shortage of experienced and qualified application support engineers.
- Most vendors are going the route of providing computer usage training to persons experienced with the application, rather than trying to provide application training to computer "jocks."
- Technology or productivity centers have been opened (by Computervision, CAE International, CDC, etc.) in several key markets where the full range of their respective products can be used under expert supervision.
- CDC continues to integrate PLATO into Cybernet to provide engineering users with computer-aided instruction on the use of software products.



#### 4. DOMINANT PRICING TRENDS

- The pressure on hardware pricing will continue. Integrated system vendors will respond with lower hardware component costs, particularly where micros and minis are involved, and improved price/performance.
- The cost of developing the needed software will continue to increase, as will the price to the end user. Software price increases will help to offset lowered hardware prices for the IS vendor.
- Because of the opportunity to tailor software products to specific market niches and to restrict the competition, software is substantially less price-sensitive than are processing services.
- RCS vendors can expect pricing pressures from large users to increase as their options become more numerous and cost effective.
- RCS vendors will find an even broader demand for fixed prices that include more and more hardware components.

#### 5. REASONS FOR USING AN OUTSIDE SERVICE

- Despite significant pressure away from the use of RCS, most of the traditional reasons for retaining RCS services remain. They include:
  - Improved turnaround.
  - Improved productivity.
  - Available capacity limitations on in-house machines.
  - Nonrepetitive mainframe CPU requirements.

- The ability to access specialized software.
- The ability to access a more engineering-oriented CPU.
- Support centers will experience a high demand because of their service and high productivity.

## 6. FACTORS INFLUENCING CONVERSION TO IN-HOUSE SERVICES

- The pressures for in-house conversion are real, widespread, and well documented. They should not be minimized. They include:
  - Annual RCS expenditures reach a cost threshold of approximately \$250,000.
  - Outside expenditures included in DP management justification for a new computer.
  - Availability of software on a supermini.

## 7. SOFTWARE PORTABILITY

- The majority of the engineering and scientific applications packages have been written in FORTRAN and are relatively transportable across processors.
- The dominant analytical packages have been developed for effective operation on all large-scale mainframe computers.
- The DEC-VAX provides the most popular environment for the development of E&S software packages. Apollo and Convergent Technology are gaining in popularity.

- The number of public domain software packages remains high, but these are difficult to use because of poor user documentation and support, and uneven quality of the code.

## 8. E&S MARKET NEEDS

- By definition, many segments of the E&S market deal with pure research and applications that will not be in common use for many years.
- Many of the current applications needs revolve around three-dimensional modeling and its graphic representation. This includes:
  - Mechanical design and detailing.
  - Process plant design.
  - Robotics.
- Robotic programming and genetics are examples of application opportunities that are a result of advances in technology.
- The most important S&E applications will remain:
  - Structural analysis.
  - Piping analysis.
  - Electronic analysis.

## 9. RECOMMENDATIONS

- Not only do RCS vendors have to continue to satisfy the market need for mainframe processing, but they have to add:

- The availability and effective use of an engineering workstation.
- Access to DBMS tools and techniques to aid integration.
- Professional services to develop tailored frontend and/or backend process capabilities that will include the use of graphics.
- Software product vendors have to attract the personnel who truly understand both the engineering and management aspects of their systems. They need to add:
  - DBMS tools and techniques to aid integration.
  - The ability to download application processing on the less-expensive micros.
- Integrated system vendors have to deliver on their promises of design and analysis capabilities that go beyond graphics. These capabilities include:
  - A clear understanding of the engineering and management functions.
  - The integration of data base tools and techniques.

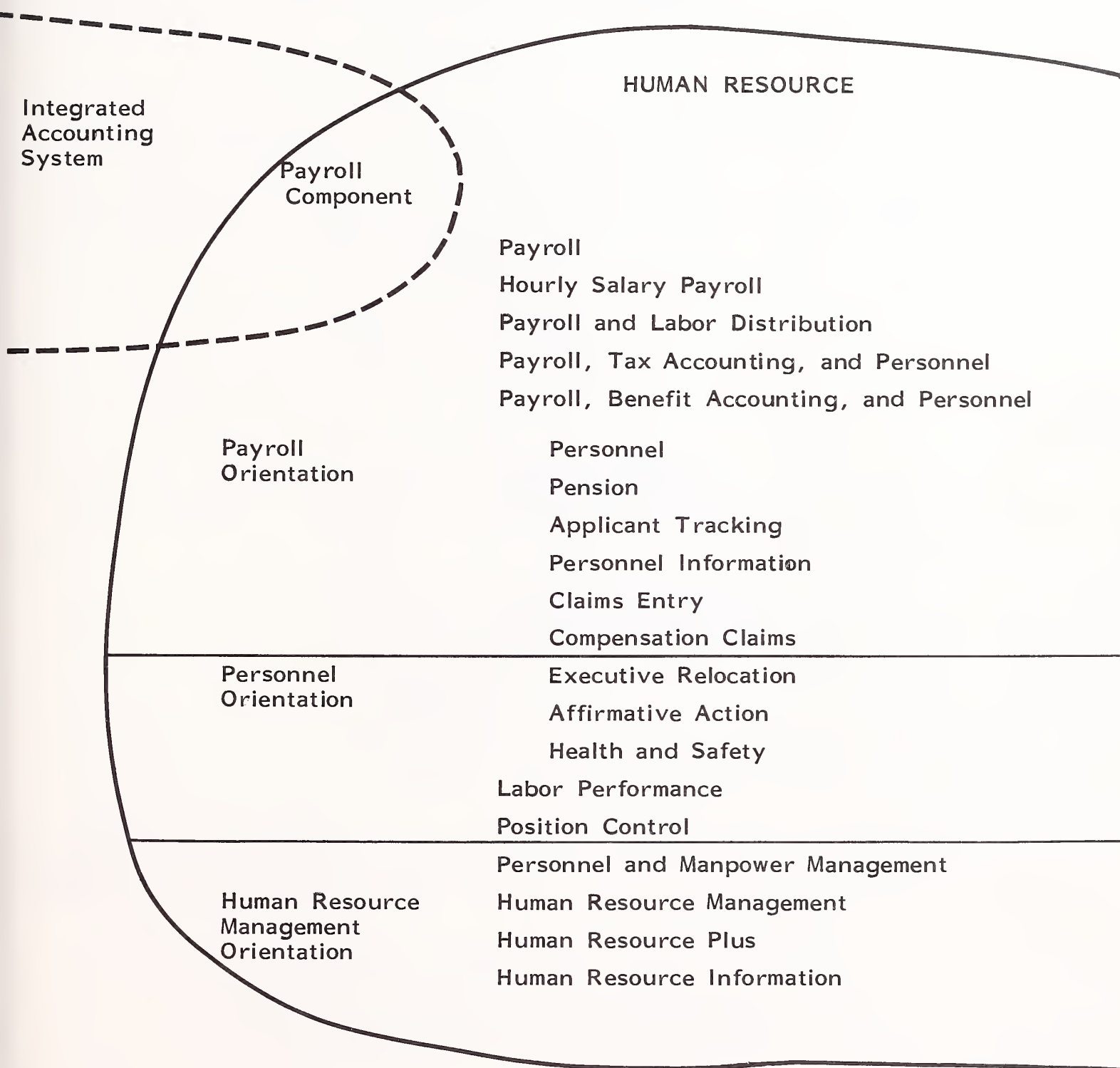
## E. HUMAN RESOURCES MARKET

### I. MARKET SIZE AND GROWTH

- The domain of cross-industry human resources applications includes payroll, payroll tax, benefits, personnel, and human resource information systems. Details are shown in Exhibit IV-25.

# EXHIBIT IV-25

## HUMAN RESOURCE APPLICATIONS

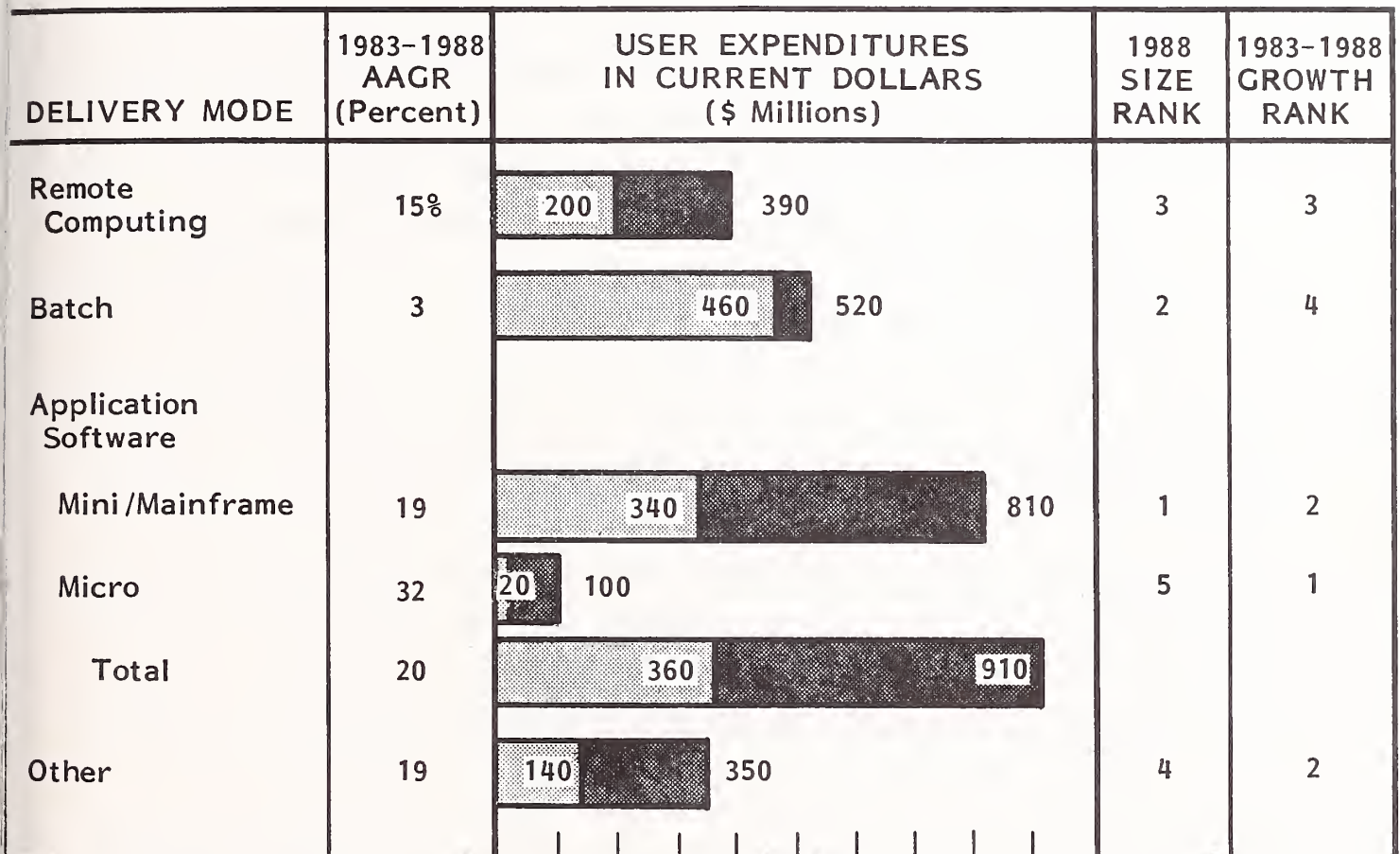




- The key marketplace factors affecting human resource application systems sales include:
  - Use of human resource information systems to increase worker productivity, a major cost factor in most industries.
  - The need for greater linkage between sources of personnel information, a need that has promoted the use of DBMS with personnel and human resource information systems. McCormack & Dodge, Information Science, and other firms have successfully capitalized upon the use of a DBMS with human resource systems.
  - The need to link payroll with accounting information for the purpose of consolidating and analyzing costs. The GENAP system of Data General and the payroll module of the Sperry ACS system address these needs.
- The fastest growing mode of service in the human resource market is applications software, as shown in Exhibit IV-26.
  - The market for applications software will grow by over \$500 million between 1983 and 1988.
  - The growth of applications software revenue will occur over a wide range of vendors and types of human resource applications.
    - Payroll systems are being marketed by IBM, Burroughs, NCR, MSA, and a number of other large and very small vendors.
    - Personnel and human resource information systems are being marketed by a smaller number of firms, several of which are dedicated primarily to the human resource market.

EXHIBIT IV-26

CROSS-INDUSTRY APPLICATIONS MARKETS FORECAST  
HUMAN RESOURCES SECTOR, 1983-1988



0 200 400 600 800 \$1,000

Total Expenditures

1983		\$1,161 million
1988		\$2,160 million

AAGR = 13%

- Demand for new benefit options or capabilities, such as direct deposit to payroll and other human resource systems, is one of the forces behind applications software growth. The desire to provide more services for employees as well as to control the cost of services provides the basis for this demand.
- The development of payroll applications software for PCs is another factor in this growth.
  - Microcomputers offer many smaller companies or subsidiaries of larger companies an opportunity to move payroll processing in-house.
  - Some larger firms, such as MSA and Micro Business Software, have a considerable number of installations on PCs. The latter has over 10,000 packages installed.
- Remote processing services used for human resource applications will continue to increase at an AAGR of 15%.
  - Payroll services will increase in dollar volume for existing customers as more benefit capabilities are added.
  - Customers of payroll services will also add personnel information capabilities to their processing work.
- Batch processing work will increase marginally as work is added to existing customers' payroll applications and new customers find batch payroll to be an easy way to initiate work. However, there will be increasing pressure on this delivery mode by PCs and remote computing services.

## 2. ISSUES AND TRENDS

- Benefit systems are occasionally being separated from payroll and other human resource systems because of new options and complexities offered as

benefits (choices of savings, insurance, investment, and even banking capabilities).

- Some companies are using or developing CMA (cash management account) capabilities to allow personnel to choose and manage their own benefits.
  - Firms specializing in payroll processing such as ADP are developing CMA-like capabilities that could be used to meet this need.
  - In general, separate benefit systems will probably be reintegrated with human resource systems over a one to three-year period.
- Personal computers will continue to be vehicles for many smaller firms to automate payroll on an in-house basis.
    - As the capabilities of PC systems increase, larger firms will use them to bring payroll in-house.
    - More powerful PCs will also provide a vehicle for offering human resources applications with more features to small- and medium-sized companies. Several vendors are preparing plans for this type of market offering.
- An issue noted by several large users is whether human resource systems should address both current and former employees.
    - Studies on the effect of benefit packages or analyses of personnel changes require a common data base.
    - Handling of rehires is simplified with such an approach.

- The number of capabilities offered by human resource systems will continue to grow.
  - The need to satisfy government regulatory requirements still exists, although it is less of a factor.
  - A factor that continues to be important is the analysis of personnel information to meet more complex work needs or to support productivity planning.
  - A more recent factor of importance is the need to support "flex" or cafeteria benefit programs. These plans offer tax benefits to employers and employees.
  - A tabulation of capabilities offered by 25 vendors is shown in Exhibit IV-27. (This exhibit does not include the use of a graphics package or DBMS query capability, both of which most vendors provide.)
- The growing complexity of human resource systems makes the selection of systems much more difficult. Vendors must be able to demonstrate the use of systems to meet simple payroll and personnel functions, as well as to prepare complex analytical reports.

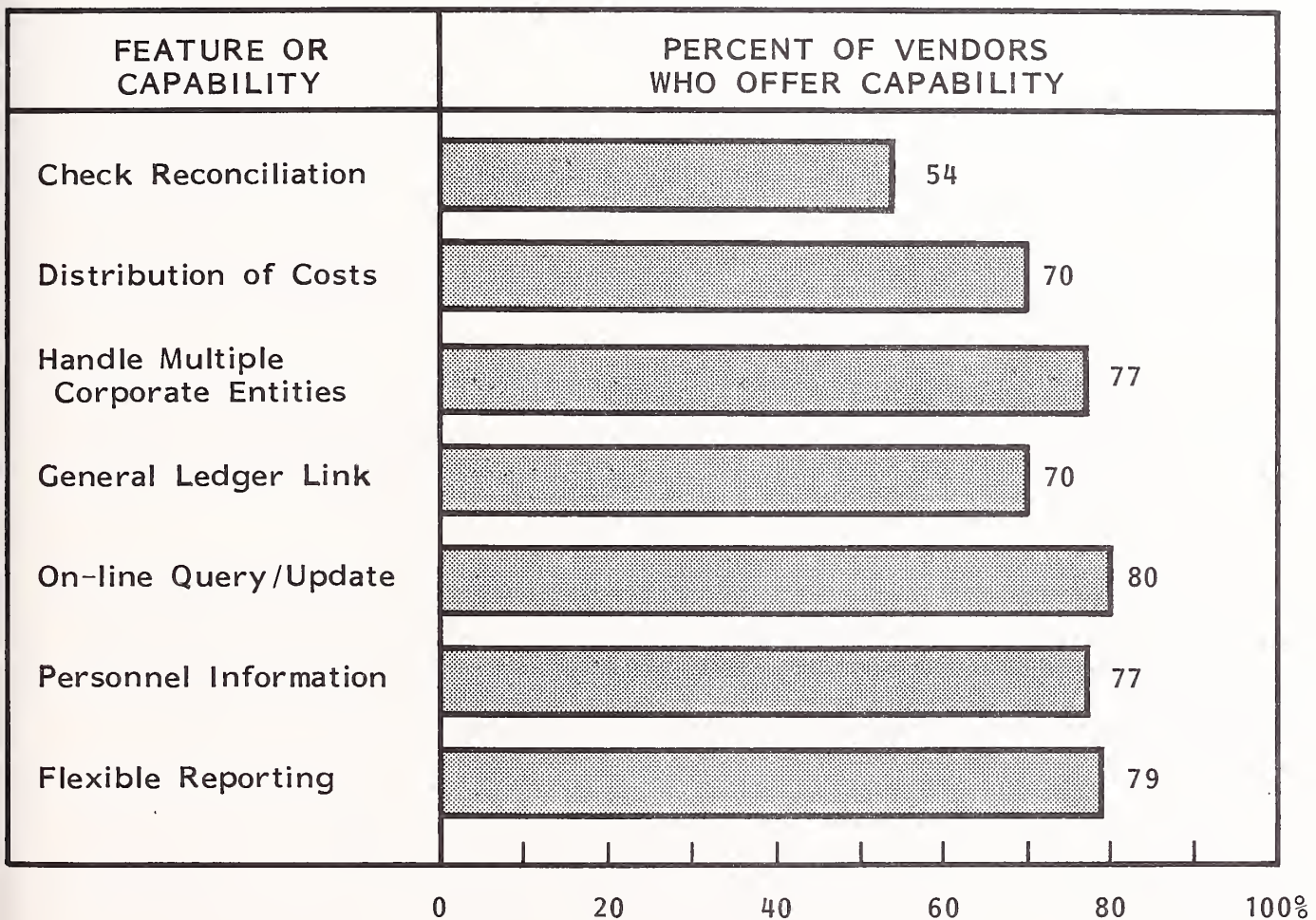
### 3. COMPETITION ANALYSIS

- An area of intense competition in human resource applications is in payroll systems.
- There are a small number of nationwide processors (ADP and BankAmerica) in the business. Both of the above firms continue to aggressively expand their presence.



# EXHIBIT IV- 27

## FEATURES OFFERED BY TWENTY-FIVE VENDORS OF HUMAN RESOURCE SYSTEMS



SOURCE: INPUT Survey

- During 1983, BankAmerica enhanced its Eastern capabilities with the acquisition of Managistics from CitiCorp.
- In addition to several smaller acquisitions, ADP acquired a unit of Computer Sciences that offered payroll services.
- The arrangement that Information Science has made with Chemical Bank to pick up payroll processing services will increase its presence as a national supplier.
- Many medium-sized and small firms (including banks) offer regional and local processing services.
  - The banks may use processing services or software packages from other vendors to provide their services.
  - Price competition and payroll packages on PCs have caused a number of regional and local providers to drop this service or sell their business to other payroll processors during the past few years.
- Price competition is appearing, in the form of low-cost batch and remote batch services, from such providers as ADP, BankAmerica, and Computer-cords, Inc. (GENPAY).
- Payroll packages that run on PCs are being offered by major software firms such as MSA, as well as by many firms specializing in PC software such as Micro Business Software and Carpal.
- A number of computer vendors, including IBM, NCR, Burroughs, and Micro-data (MCAUTO), also offer payroll systems on small computers that can be used to move payroll processing in-house.

- ADP and other payroll processing vendors are prepared to move processing work in-house as well.
- Information Sciences, MSA, McCormack & Dodge, and Wang are among the vendors offering more complex payroll/personnel systems. There are fewer vendors involved in this marketplace segment than in the area of payroll previously discussed.
- More competition is appearing in the marketplace for human resource systems.
- A range of capabilities is important to potential users.
  - A DBMS or fourth-generation language capability is very desirable to meet this need.
  - Graphics output is also desirable since data may have to be presented to a number of groups for their review.

#### 4. RECOMMENDATIONS

- Some processing services and software packages do not provide timely information for cash management planning. This need should be considered since it will become an increasingly important factor in the selection of a new system.
- Once payroll and limited personnel systems are operational on PCs, users will want to expand information available for employees as well as expand reporting capabilities.
  - Vendors should be prepared to expand system capabilities.
  - Add-on systems could be developed for popular payroll systems.

- Software packages should be provided for PCs that allow departments and small organizational units to maintain local records in conformance with personnel and human resource information systems used at a corporate level. Large information systems users have told INPUT of this need.
- To aid planning and personnel analysis studies, personnel and human resource information systems should be able to include past as well as current employees.
- According to users, a major factor in the decision process for human resource systems is the range of features and capabilities available with the system, as shown in Exhibit IV-28.

## F. ON-LINE DATA BASE MARKET

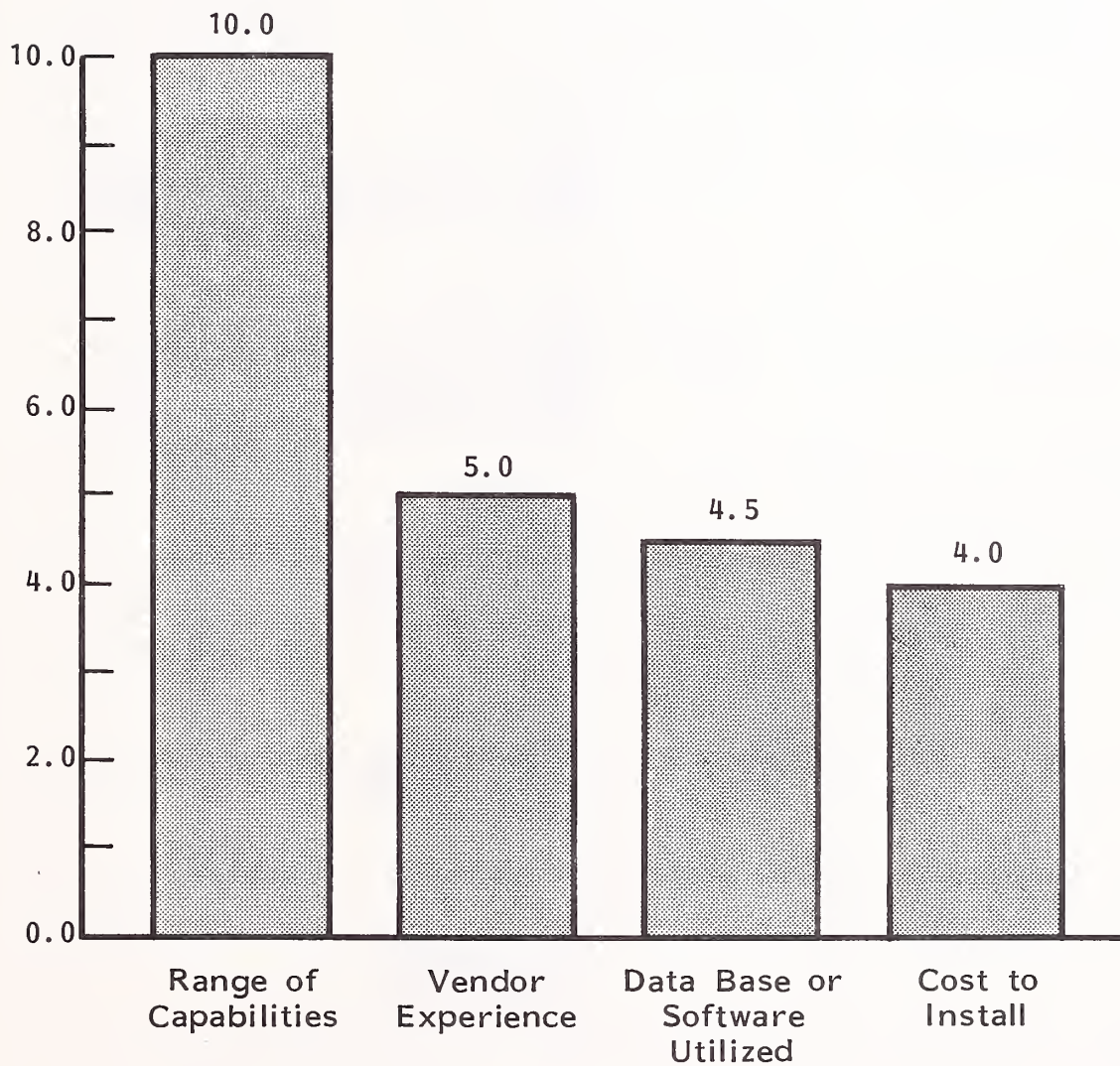
### I. MARKET SIZE AND GROWTH

- The on-line data base market is emerging as one of the major marketplace opportunities of the 1980s. Combined user expenditures from both cross-industry and industry-specific applications will total \$4.6 billion by 1988, up from \$1.6 billion in 1983. This represents a five-year average annual growth rate of 23%, as shown in Exhibit IV-29.
- These forecasts exclude revenues derived from related applications (e.g., analysis software for manipulating the data once it is obtained). Also excluded are revenues from redistribution arrangements (e.g., vendor A licenses its data base to vendor B who offers it on a communications network).
- The cross-industry component of the market will have an AAGR of 22% and will grow from \$0.6 billion in 1983 to \$1.7 billion in 1988.



EXHIBIT IV-28

RELATIVE IMPORTANCE OF DECISION FACTORS FOR  
HUMAN RESOURCE INFORMATION SYSTEMS

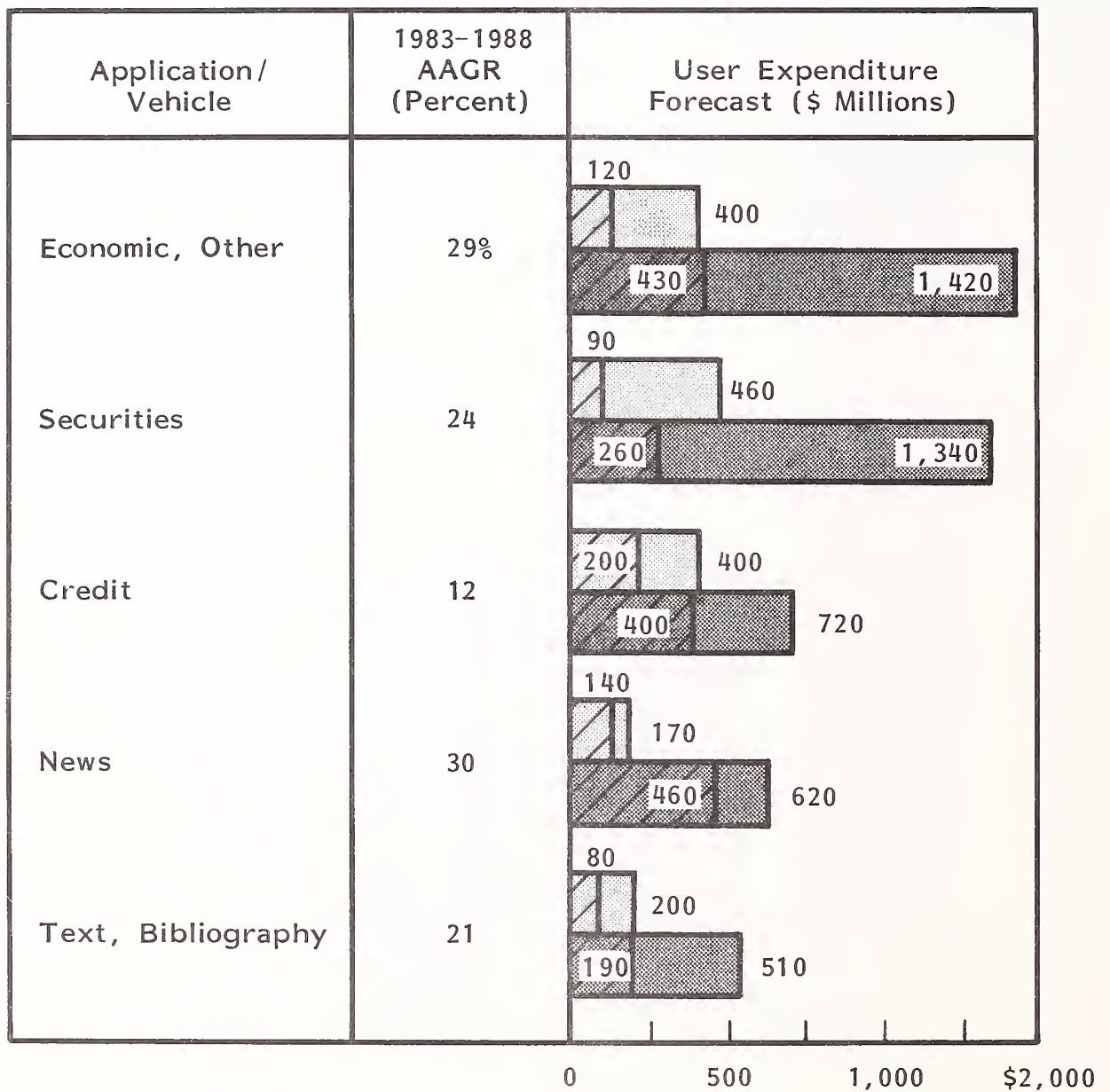


SOURCE: INPUT Survey



# EXHIBIT IV-29

## ON-LINE DATA BASE MARKETS RANKED BY 1988 SIZE



1983		Total	1,630
		Cross Industry	630

1988		Total	4,610	23% AAGR
		Cross Industry	1,740	22% AAGR

- Four out of the five categories of on-line data base services have a five-year AAGR in excess of 20%. News data bases lead the high growth list with a 30% AAGR. Economic/other data bases are the second fastest growing, with a 29% AAGR.

## 2. ISSUES AND TRENDS

- Changing cost structures are altering the characteristics of the on-line data base market. Lower hardware costs, especially for PC-based CPU and storage devices, combined with higher telecommunications costs, are resulting in services that emphasize downloading of data base information for local processing.
- The proliferation of personal computers in both the office and the home will provide vendors with literally millions of available access points.
- Dedicated terminals for on-line data base services are being replaced by PCs. This improves the economics of using multiple data bases for the end users, thus helping them to cost-justify additional data base services. For the vendor this replacement is a mixed blessing since it removes the opportunity provided by the dedicated terminal to lock in a customer.

## 3. RECOMMENDATIONS

- A number of opportunities await information service vendors interested in the on-line data base services market. These include:
  - Targeting home-based personal computers. For many managers and professional personnel, some of their most productive work time occurs at home, away from the distractions of the office. A data base user who might have only a few minutes of uninterrupted time at the office can often find hours at home.

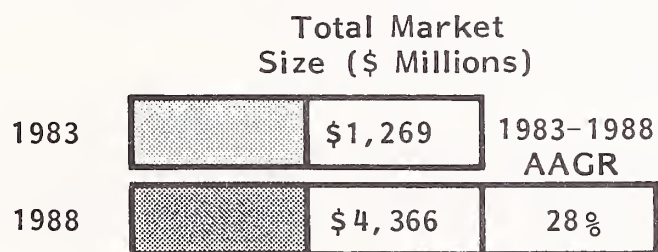
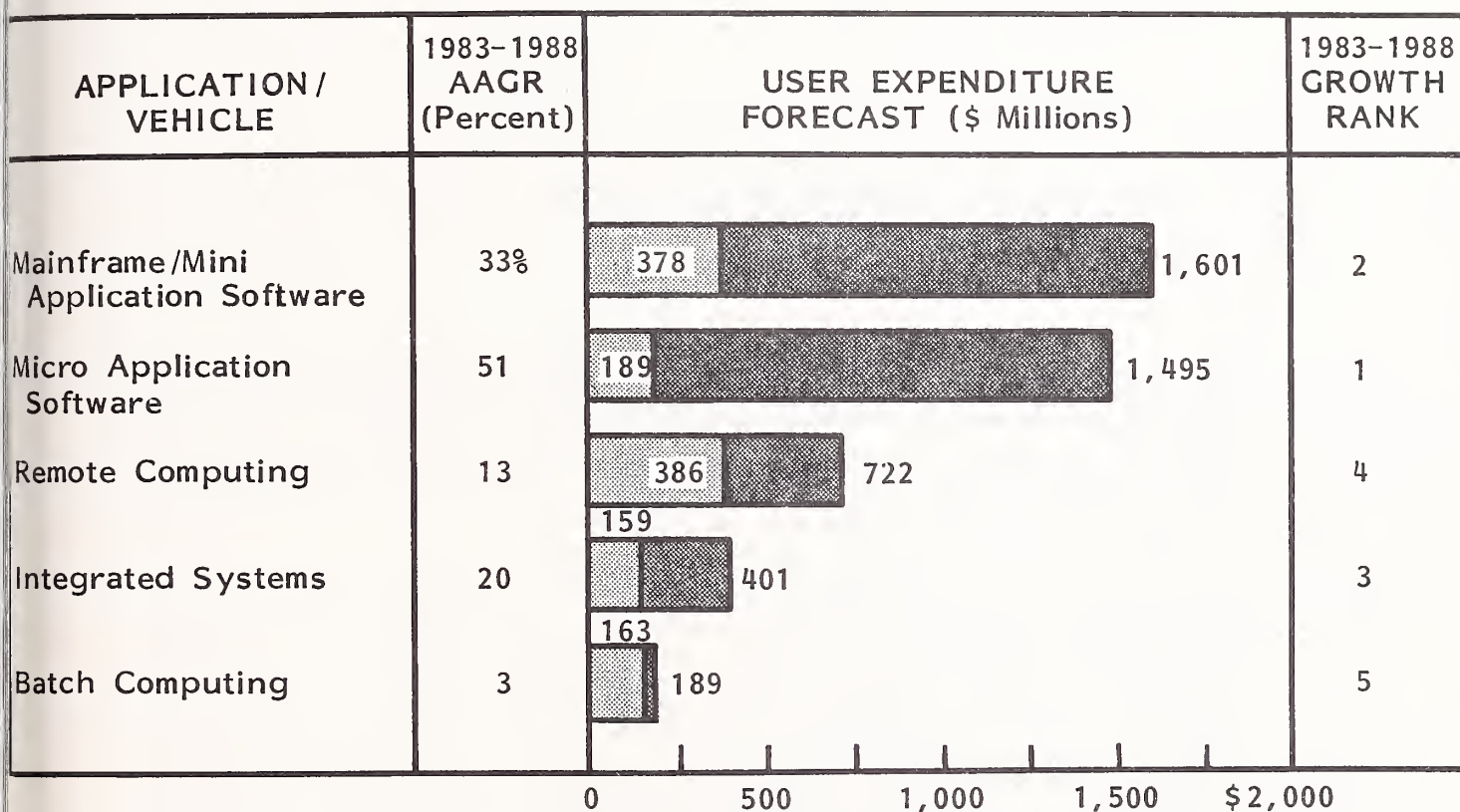
- Using spinoff data from transactions processing to create new data base services. Many vendors process huge amounts of transaction-oriented data, often for numerous customers from the same industry or functional area. By creatively collecting, formatting, and repackaging such information, a new data base service can result that not only provides its own stream of revenue, but also further ties existing customers into the vendor's firm.
- Seeking license arrangements with third parties and their data base capabilities that can complement existing services.
- Opportunities also exist for software product and telecommunications services vendors. Strong needs exist for improved data handling and interface software to improve the quality, reliability, and economic attractiveness of data base services.

## G. PLANNING AND ANALYSIS MARKETS

### I. MARKET SIZE AND GROWTH

- Planning and analysis is the second largest and second fastest growing cross-industry market for information services vendors. As shown in Exhibit IV-30, user expenditures will increase from \$1.3 billion in 1983 to \$4.4 billion in 1988, a 28% AAGR.
- Planning and analysis is a major cross-industry market for a number of delivery modes.
  - It is the fastest growing personal (micro) computer applications software market, with a 51% AAGR.

EXHIBIT IV-30  
 PLANNING AND ANALYSIS CROSS-INDUSTRY APPLICATIONS MARKETS  
 RANKED BY 1988 SIZE





- At 33% AAGR, it is the second fastest growing cross-industry market for mainframe/mini applications software products.
- For remote computing services vendors, it is the third fastest growing market, with a 13% AAGR.

## 2. ISSUES AND TRENDS

- A number of factors are contributing to the health of the planning and analysis sector.
  - The target market for planning and analysis applications is the manager/professional. Productivity improvements directed at this group offer much promise, since this category of employees accounts for as much as two-thirds of the cost of a typical office.
  - Technology advances in both hardware and software are enabling previously simple planning/analysis systems to evolve into not only decision support systems, but also into decision-making systems. Continued advances in artificial intelligence techniques will enable both knowledge-based and expert systems to become increasingly commonplace by the mid-80s.
  - The emergence of improved organizational approaches to computing, such as information centers, is encouraging greater computer involvement for end users.
  - Software advances, such as fourth-generation languages and relational data base systems, are providing a friendlier interface.
  - The market success of cleverly integrated software packages, such as Lotus 1-2-3 and Context MBA attract manager/professional people to the computer, and then whets their appetite for more sophisticated analyses.



- User demand for PC-to-mainframe links has resulted in numerous hardware and software offerings that make it easier to extract data from a central data base and download it to a PC for local analysis.

### 3. COMPETITION ANALYSIS

- In order to rapidly exploit the interest in PC-based planning and analysis, a number of vendors have entered into joint marketing and/or development arrangements.
  - Informatics General and Applied Data Research entered into agreements with VisiCorp to develop links between their mainframe-based systems and the ubiquitous VisiCalc.
  - McCormack & Dodge is cooperating with Lotus Development Corporation to tie their financial systems to the popular Lotus 1-2-3 integrated software system.
  - University Computing Company acquired the rights to market Context MBA as UCC MBA in order to provide PC access to UCC financial systems.
- MSA was one of the first financial systems vendors to see the PC potential. They developed Executive Peachpak to enable clients to download mainframe financial data to PCs.
- Most major vendors of financial planning software are offering PC versions in order to take advantage of the increasing power and popularity of the PCs. Examples include Focus (Information Builders), IFPS (Execucom Systems), and System W/Micro W (Comshare).

#### 4. OPPORTUNITIES AND RECOMMENDATIONS

- Vendors anxious to more aggressively participate in planning and analysis market growth should include the following strategies:
  - Monitor advancements planned by leading PC systems software vendors that relate to improved analysis techniques. Make decisions early in the product life cycle in order to include their developments. Examples include Windows by Microsoft, VisiOn by VisiCorp, 3270-PC and XT/370 from IBM.
  - Try to avoid in-house development of any system that can more quickly and economically be obtained via joint ventures with third parties. Time is of the essence in this marketplace.
  - Find ways to integrate transactions systems with analysis systems, and vice versa. The best-accepted systems in the future will have these linkages.
  - Incorporate fourth-generation languages and DBMS in systems upon which you will be dependent for important revenues during the next several years.

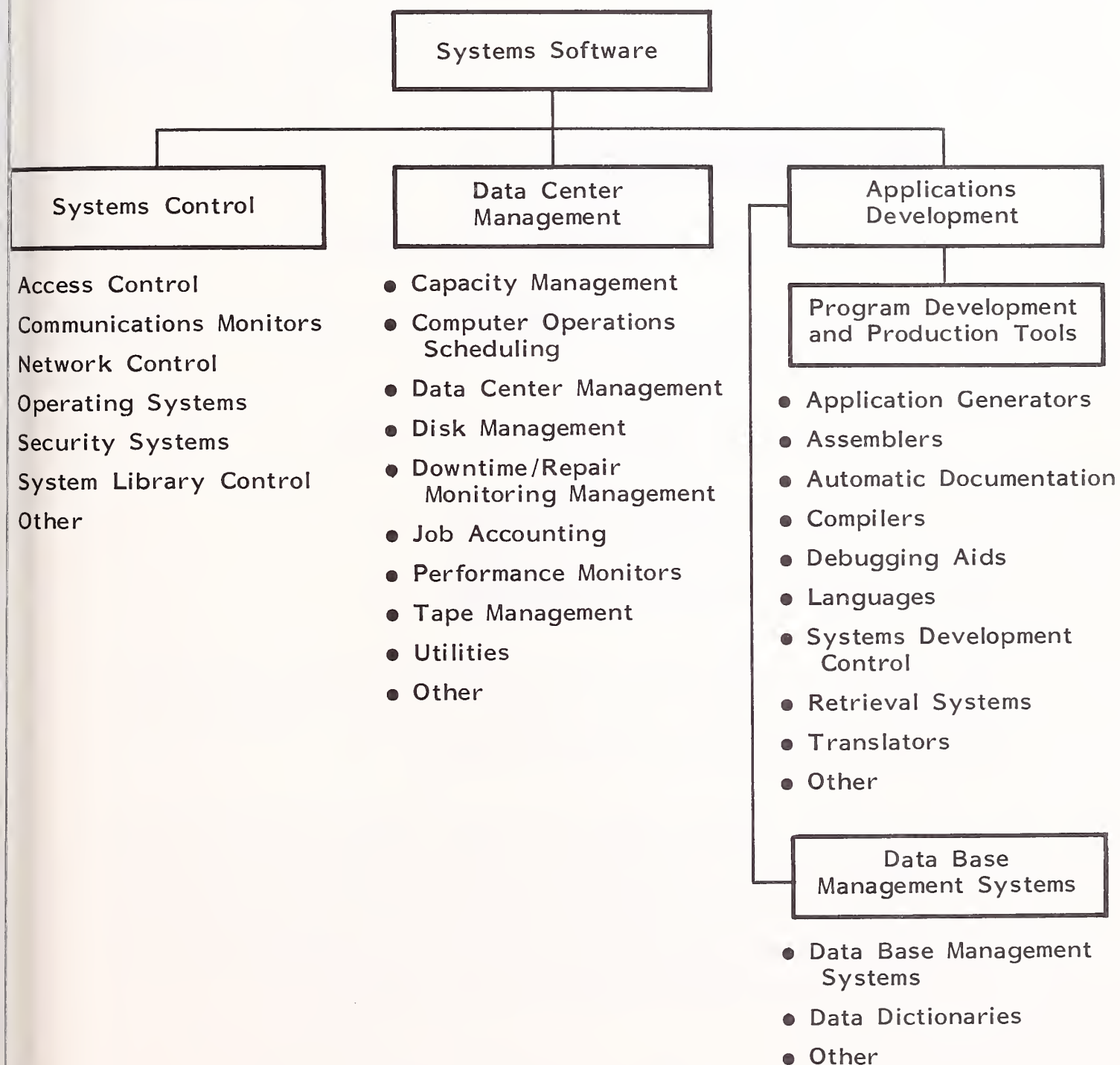
#### H. SYSTEMS SOFTWARE MARKETS

##### I. MARKET SIZE AND GROWTH

- The systems software product market is composed of three main sectors, as shown in Exhibit IV-31.

EXHIBIT IV-31

SYSTEMS SOFTWARE PRODUCTS  
MARKET STRUCTURE

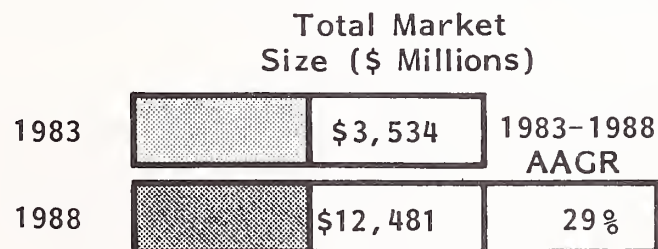
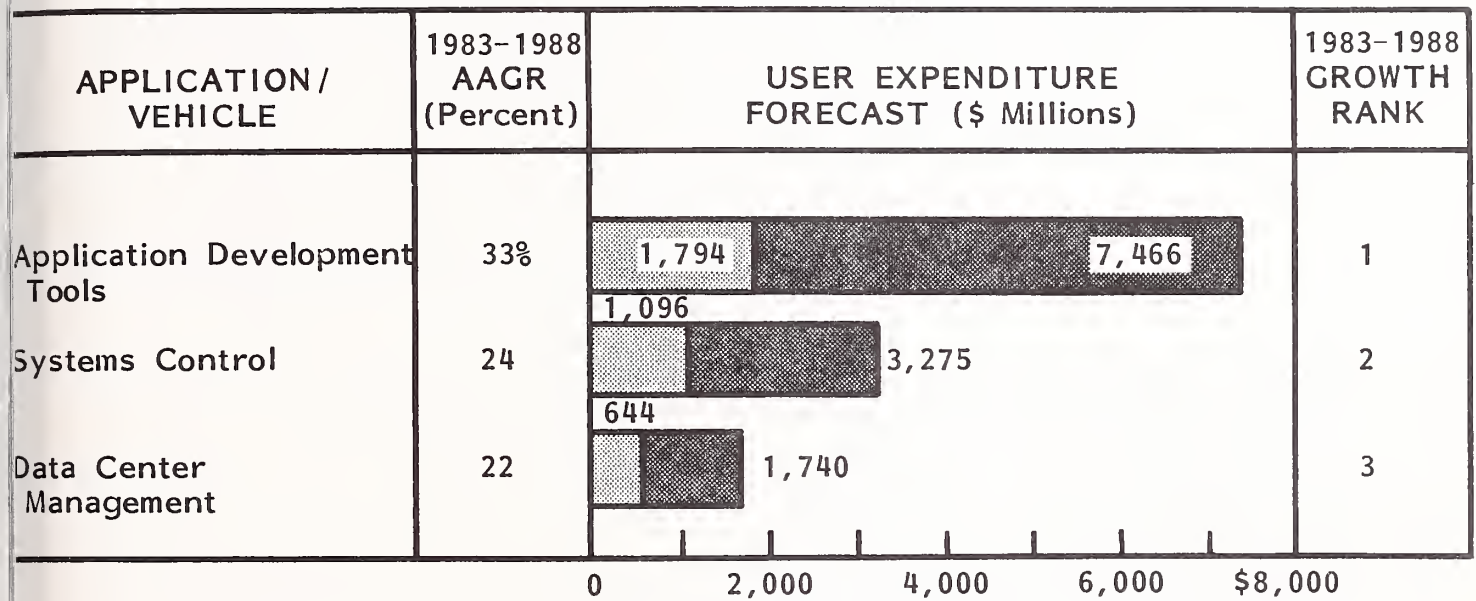


- The overall market is growing at a healthy 29% AAGR, as shown in Exhibit IV-32. From a base of \$3.5 billion in 1983, systems software products will become a \$12.5 billion opportunity in 1988.
- Many aspects of the revolution in end-user computing are fueling this growth. Examples include:
  - Explosion of PC sales.
  - The proliferation of information centers.
  - The rapid acceptance of fourth-generation languages.
  - Increased emphasis on better user interfaces (e.g., windowing, icons, on-line help functions).
  - Demands for more effective PC-to-mainframe links.
  - User interest in integrated applications.

## 2. ISSUES, TRENDS, AND OPPORTUNITIES

- From a technical standpoint, systems software has historically been defined as software used to support other software, i.e., it is not applications software, which is used to directly support user needs.
  - In the past, this also meant that from a vendor's standpoint system software would be bought by professional data processing staff, generally those in the operations or systems programming areas. However, the rise of the PC has changed the situation, since much very technical PC software is bought by people who are end users.

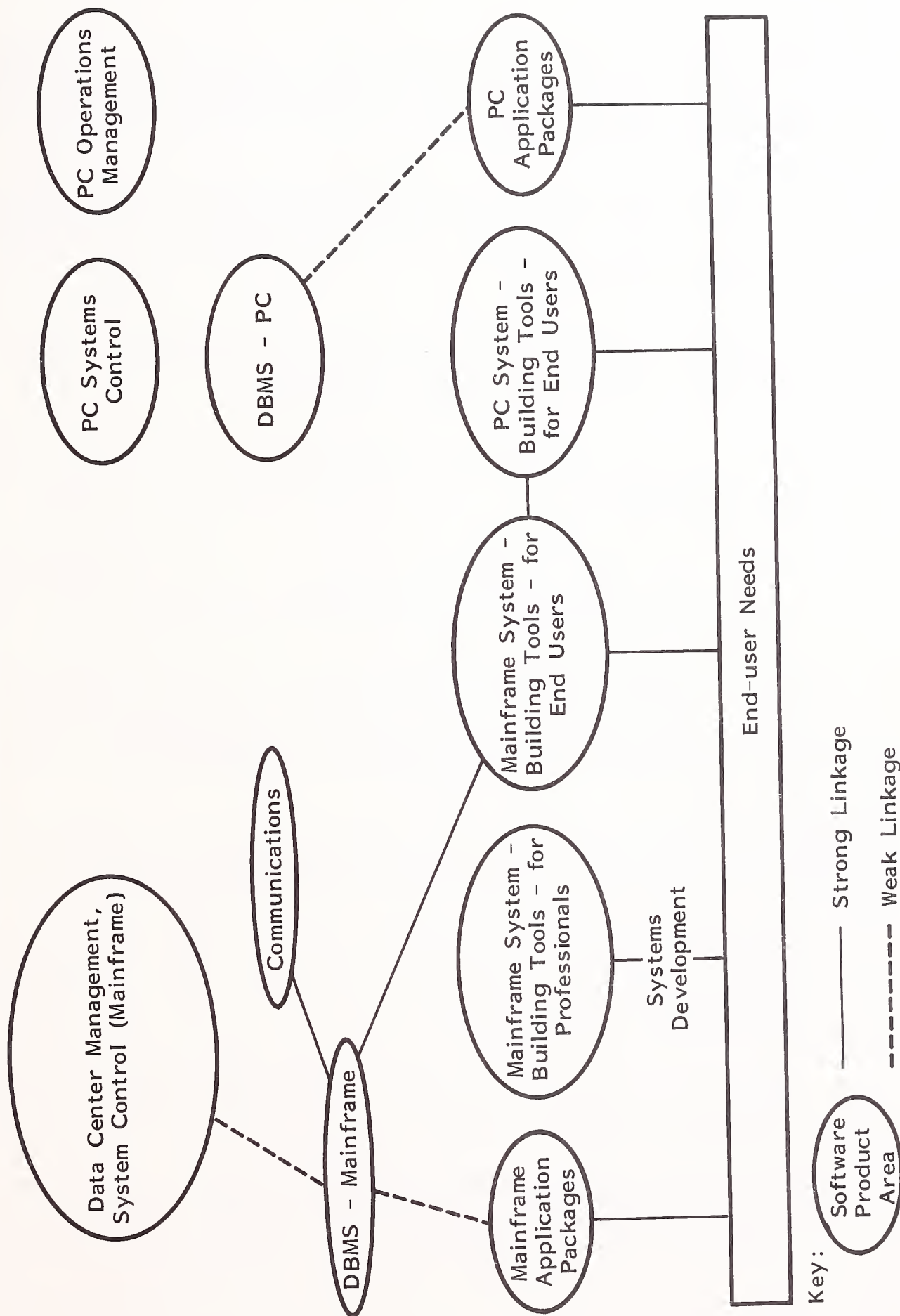
EXHIBIT IV-32  
SYSTEMS SOFTWARE MARKETS  
RANKED BY 1988 SIZE





- Similarly, the rise of fourth-generation languages (FGLs) has meant that end users often construct applications using, at the least, subsets of sophisticated software tools.
  - . As a result of these phenomena - the spreading use of PCs on the broad front and the increasing use of FGLs on the narrow front - the definitional walls separating system and application software are becoming more porous.
  - . INPUT believes that this is just one of the changes that will affect the systems software area.
- Another significant feature of the systems software marketplace is its fragmentation and lack of integration, as shown in Exhibit IV-33.
- The lines in Exhibit IV-33 indicate both the functional relationships between the different system products and business relationships between firms supplying these products.
- Data base management systems vendors have been the first to move beyond their narrowly defined product boundaries into other systems offerings.
  - This is partly due to the fact that a DBMS alone is useless and must be accessed and supported with a wider range of tools to realize its full potential.
  - It is owing to the fact that DBMS products naturally inhabit a "middle ground" between users - both professionals and end users - and products such as data center management, systems control, and to a lesser extent, communications, which exist solely to enhance the productivity of hardware.

# HISTORIC SYSTEM SOFTWARE PRODUCT LINE RELATIONSHIPS



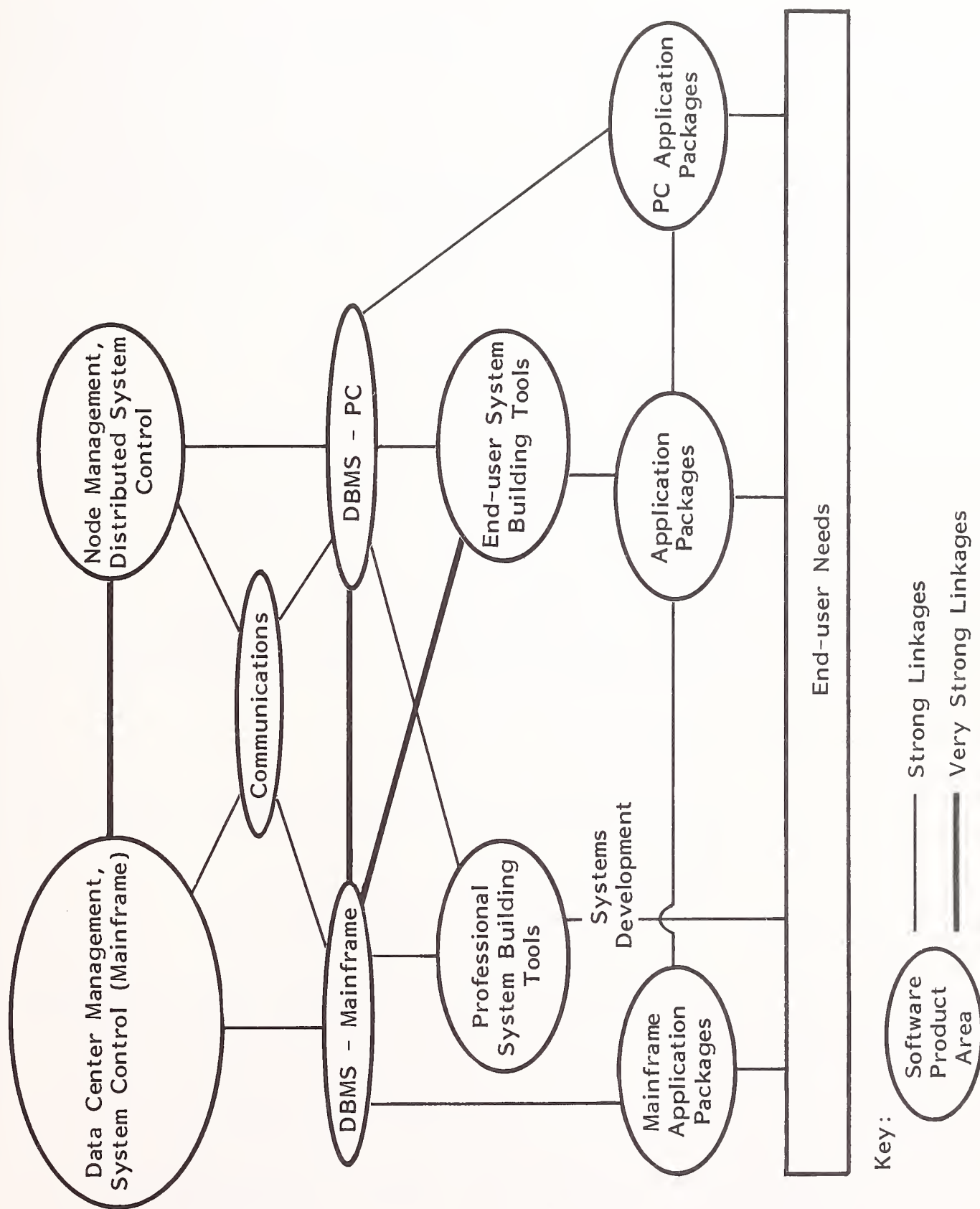
- Another facet of market fragmentation occurs in the PC mainframe markets where, with a few recent exceptions, PC and mainframe system software vendors inhabit different worlds.
  - This had already begun to change somewhat with the announcements of several vendors of different types of mainframe-PC links (e.g., Informatics, Cullinane, ADR).
  - However, the announcement of IBM's XT/370 and 3270/PC will have an explosive effect on mainframe/PC integration:
    - The de facto IBM PC standard will become even more pronounced.
    - The XT/370 is especially interesting because it will promote semitradeitional IBM software in totally new areas.
    - Providing a bridge from MVS software to PCs (under VM) is both a blessing and a curse: continuity and compatibility are promoted, but at the cost of efficiency and ease of use.
- Except for Cullinet and Cincom, most DBMS vendors have not taken the strategy of building up a stable of DBMS-based applications products.
  - ADR is not offering applications, but is instead offering a large integrated collection of productivity tools for both professional programmers and end users.
  - Software AG and others have taken the approach of offering a more limited set of productivity tools.
  - Computer Associates has moved into micros but to date is treating them as an autonomous product line.

- Many of the products aimed at the mainframe data center management and systems control markets are offered by specialist companies, such as:
  - Johnson Systems.
  - BGS.
  - Boole & Babbage.
  - Duquense.
- There are two forces that will change the organization of the systems software business:
  - The need to integrate PCs into the corporate information plan.
  - The need to increase the efficiency and productivity of producing applications software, and at the same time, the need to tailor software to specific user needs and change the software on demand.
- One effect of these forces will be that traditional mainframe-oriented products that are supplying data center management and system control functions will have to also be able to manage the systems nodes (which will be largely PCs).
  - It is unclear how many mainframe-oriented vendors (and even more so PC-oriented vendors) can make this transition:
    - The many smaller firms that now exist may not have sufficient human and financial resources. At the least, the smaller firms will be forced to coalesce to develop comprehensive products.

- They will be even more stretched by the diverse marketing demands that will be placed on them.
- The larger, more mature firms will come into their own, being far more suited to developing and marketing a broad, integrated range of products.
- The production of software productivity tools, most notably FGLs, presents a more evident trend.
- FGL products are a means of pulling together mainframes and micros. At the same time they support diverse applications that formerly needed either specialized packages or custom-developed programs using conventional programming languages.
  - FGLs will enable users to build their own systems.
  - At the same time FGLs are a very strong unifying force between mainframe and micro DBMS since FGLs are either attached to a DBMS (IDEAL and NATURAL) or have their own DBMS-like qualities (RAMIS II, FOCUS, NOMAD2).
- The mainframe-PC bridge and end-user productivity tools are two "clusters" of function that will naturally pull similar products into common vendor groups. Exhibit IV-34 shows how these relationships will appear compared with the weaker links presented in Exhibit IV-33.
  - The common need that both clusters will have for communications may make communications monitors, measurement, local networks, etc., the battleground between vendors specializing in one cluster or another.



# FUTURE PRODUCTIVE SOFTWARE RELATIONSHIPS



- Alternatively, super systems software vendors may emerge, offering a wide portfolio of products.
- Such "software conglomerates" will be faced with the question of whether to offer applications software in addition to systems software. A few vendors, like Cullinet, have made the choice already. The choice for smaller vendors, however, will not be an easy or obvious one.
  - On the one hand, there are significant benefits:
    - Sharing of administrative and marketing overheads.
    - Diversification of technological and marketing risks.
    - Opportunities for tie-in product sales.
    - Perhaps most important, account dominance or even control.
  - On the other hand:
    - The organizational and technical management problems are daunting.
    - Start-up and development expenses will be high.
    - Compatibility needs may force products to the lowest common denominator.
    - Sales training and coordination will be complex.
- A less appreciated and equally onerous problem is the increasing diversity of buying points within a customer organization of those vendors who should sell

the full range of systems/application software for both mainframes and PCs. The extent of this problem is suggested in Exhibit IV-35, which hints at the complex, fragmented, and as yet unexplored terrain confronting the vendors who take this path.

- In the future it will be necessary to represent the three dimensions of software companies in order to distinguish the specialists from the conglomerates.
  - These dimensions are:
    - The range of applications (if any) offered.
    - The depth of system software offered.
    - The hardware environments the software operates in.
  - Exhibit IV-36 shows examples of different types of software companies, symbolized by different types of rectangular solids.
    - The large conglomerate.
    - An applications-oriented company.
    - A DBMS company expanding into applications.
    - An IBM systems software specialist.
- System software and especially system software markets are undergoing rapid change, propelled from the outside by PCs and the increasing sophistication of microprocessor technology, and from the inside by fourth-generation languages, which finally hold the promise of making computing accessible to millions of end users.

## EXHIBIT IV-35

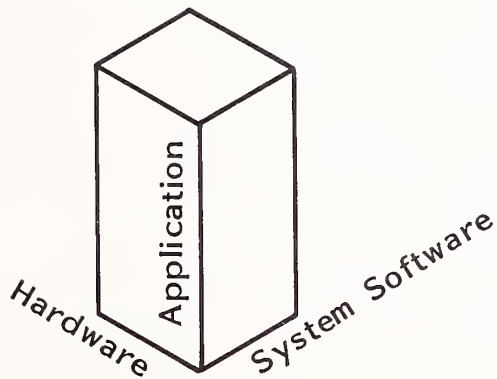
ORGANIZATIONAL RESPONSIBILITY BY  
SELECTED SOFTWARE PRODUCT AREAS

SOFTWARE PRODUCT AREA	ORGANIZATIONAL AREA				
	I.S. STAFF			USERS	
	Technical	Applications	Management	All Professionals	Specialists
DBMs Mainframe	D				
PC	A		A	D	
Communications Mainframe	D				
PC	D			A	
Operations Mainframe	D				
PC			A	D	
System Building Tools Professional	A	D			
End-User Application			A	D*	
Cross-Industry Accounting, Human Resources		A			D*
Planning and Analysis			A	D*	
Industry Specific		A			D*

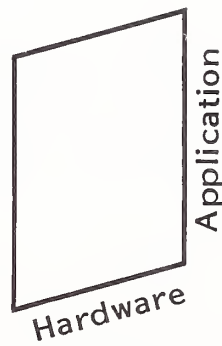
\* Very pronounced for PCs; increasingly so for mainframe software  
Key: D = Decides, A = Advises, Assists

EXHIBIT IV-36

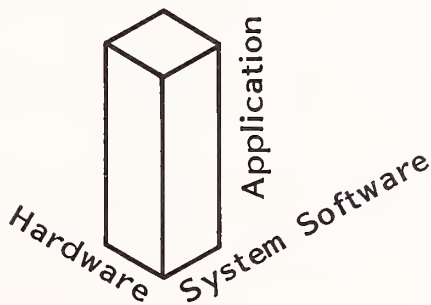
SOFTWARE COMPANY SHAPES



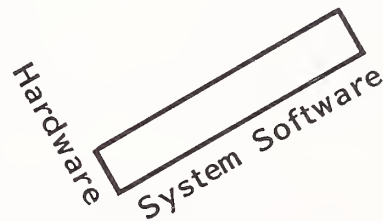
(a.) Conglomerate



(b.) Applications-oriented  
Company – Many Hardware  
Environments



(c.) DBMs Company Offering  
Some Applications



(d.) IBM-oriented Systems  
Software Specialist



- The next five years should see major changes in products, marketing, and the organization of firms serving this market.
  - Small, specialized system software houses should not be complacent. Some kind of partnership with larger firms - license agreements, joint development, being absorbed - will become increasingly necessary for access to the market.
  - Large companies should address their own directions and resources, deciding whether the conglomerate role is desirable and/or feasible, or whether instead they should consolidate to dominate certain market niches.

## I. UTILITY PROCESSING

- Although the utility processing services market is not growing rapidly, it is a market that a group of vendors make an effort to not only maintain but increase.
  - Utility processing can add to the bottom line without substantially increasing the use of resources or support services.
  - This processing revenue may be obtained from existing customers now buying planning and sales applications.
  - It may also be added through the presence of certain capabilities.
  - It can improve the profitability of accounts.
- The total volume of utility processing in 1983 will be about \$1.36 billion, and will continue to grow at a 13% rate.

- In addition to the use of raw time in manufacturing, engineering, and government, utility processing includes:
  - The use of large-scale facilities that support a number of programming languages, software capabilities, and program libraries, in order to develop systems or run large programs that would be difficult to accomodate in-house.
  - Periodic processing of large-scale models for utilities or business planning.
  - Portions of large network applications that utilize user programs in addition to vendor-written software.
- For both large and small RCS vendors, ingenuity in sales techniques and inventive software personnel have continued to generate utility-processing work.
- Efforts to obtain utility-processing work rely upon selecting targets as well.
- RCS vendors consolidate processing done on other services or at various user sites.
  - This consolidation may be the first step in moving work to new user hardware or may be part of a development program.
  - This consolidation could be in support of a program to use PCs.
- This type of work is constantly necessary to replenish the utility processing that is moving to other networks or is moving in-house to minis and particularly micros.

- Customers are moving all the work for some applications to micros and are moving part of the volume for other applications (where all the capabilities of the RCS systems are not required).
  - As the capability of new, powerful micros such as the Charles River machine become available, users will move work to them.
  - Economic pressure can force users to move work in-house or can force them to drop work with little notice.
  - Users can easily change some utility processing to new vendors (to take advantage of lower prices or new capabilities).
- Large RCS vendors such as GEISCO, Tymshare, BCS, and IBM may offer network, graphical capabilities, very high speed or microfilm output, and libraries of software that can encourage users to move utility processing.
    - EDS has set up a large network capability for credit unions that can generate utility-processing business.
    - The GEISCO network, together with the use of on-site hardware, has resulted in utility processing as well as the sale of industry-specific systems.
  - Cash management systems that use network capabilities, such as the systems sold by GEISCO, NDC, and ADP, have encouraged the development of customized software by users to handle special processing or output needs.
    - This type of utility processing has increased significantly in the last five years.
    - Some of this processing will be moved to micros installed at user sites, however.

- Development of micro-based cash management systems for mid-sized and smaller corporations by GEISCO, ADP, IBM, and other vendors may lead to new industry-specific or utility processing for these corporations or their banks.
- One technique that is used to generate and maintain utility processing work in business and engineering activities is to have applied mathematicians and high-level software people available to help users develop complex applications.
  - These applications may combine the advantage of proprietary software with user programs that will make it difficult to move jobs in-house. Several money center banks continue to run complex processing of this type at RCS facilities.
  - Both large and small vendors use this technique to generate utility work.
  - Several vendors, such as STSC (now part of Continental Telecom) and IP Sharpe, have used APL capabilities to generate utility processing in this manner.
- Extremely complex business models are being designed and run today, and much of this work is developed and run effectively at RCS vendors.
- Some RCS vendors have econometric data bases and data bases of information on corporations that are available for access and manipulation by corporations. With these data bases, users have developed models to test marketing, product development plans, and financing needs.
- Vendors, who have stayed in contact with the techniques of project development that are taught at engineering colleges, have provided capabilities that lead to the use of utility processing.

- Research personnel and students at college computing centers are encouraged to develop systems that include modules in various programming languages, together with library routines. This expedites the development and test of new computational techniques.
- Development time is saved, although demands are made upon the facilities available at a computing center. 6
- When these students enter industry and attempt to set up similar jobs, it is much easier to handle such work at an RCS company than it is to use an internal computing center.
- Several RCS vendors also have experts in computational methods in various engineering fields on their staffs. These people consult with users and help them address problems.
- This will help to generate utility processing work.
- This technique is most effective for companies such as CDC that offer processing time and a large library of technical applications and routines.
- There are non-RCS firms that have contributed to the growth of utility processing in the past, but that have been moving in-house recently. Examples are:
  - General consultants and public accounting firms that run their own specialized business models and analytical systems.
  - Engineering firms that have developed systems that are based on their own expertise and which are used to study client problems.



- Both large and small firms of these types have found it possible to reprogram jobs to run on in-house resources.
- However, several Big Eight firms are still major users of RCS.
- The size and complexity of RCS programs, as well as the ability to access them from multiple sites or a client's premises, make RCS attractive.
- The increase of PC capabilities has been one of the drains on RCS utility processing during the last few years, but vendors have developed strategies to respond to this situation.
- RCS vendors have developed frontend and output programs for PCs that would make it attractive to run utility processing on their services. These programs edit input, format output, and handle some processing, thereby reducing RCS costs.
  - GEISCO has developed a strategy for PC use that will promote RCS work, including utility processing.
  - Vendors are also developing and introducing PC systems that will aid remote development of RCS jobs.
- Vendors are also working with users to develop programs on PCs that will allow the user to access powerful capabilities (only when needed) from a large mainframe and to use a PC for the rest of the work.
  - This approach could provide an alternative to using an in-house mainframe for certain types of engineering work.
  - The user could address a mainframe job when only a PC is available to handle processing.

- One of the continuing methods for finding utility processing work is to handle peak workloads for IS installations.
  - Excess demand during peak periods from certain technical and business users provides one source of work.
  - Demand to use applications from a central IS capability at a remote office may provide another source of this type.
  - An RCS vendor must become aware of the possibility of this work and be prepared to run it for accounts the vendor is in contact with.

## J. VALUE-ADDED NETWORKS

### I. MARKET SIZE AND GROWTH

- Value-added networks (VANs) continue to play a major role in the information services industry. In recent years this role has taken on several forms. Industry participants are employing VANs as:
  - A method of augmenting coverage of in-house networks at the larger firms.
  - Virtually the sole source of networking at smaller firms.
  - As a "spinoff" line of business in which existing networks are separated from processing and sold as independent entities to existing and new clients.
- The market for VANs will grow significantly during the next five years. From a base of \$260 million in 1983, the market will grow at a healthy 38% AAGR

to become \$1.3 billion in 1988. The cross-industry sector is \$210 million in 1983 (39% of the market). By 1988 it will grow at an AAGR of 27% to become \$690 million (52% of the market).

- The fastest growing part of the market is the industry-specific sector. Starting from a small base of \$50 million in 1983, it will explode at a 66% AAGR to become \$630 million by 1988.

## 2. ISSUES, TRENDS, AND COMPETITIVE DEVELOPMENTS

- During 1983 several RCS firms spun off existing networks, adding to the existing participants. Firms entering the network marketplace formally include:
  - General Electric Information Services (GEISCO), with its MARK-NET offering.
  - Computer Sciences Corporation (CSC) has also unbundled the network portion of its Infonet Service.
  - ITT entered the market with a limited five-city packet-switched network.
- During 1983 these vendors joined the dominant suppliers Telenet and Tymnet, and the existing "second tier" carriers ADP Autonet, CompuServe, and Uninet. Additionally, an interesting phenomenon occurred in which certain of the second tier carriers acted as resellers for Telenet and Tymnet. Taking advantage of negotiated, large-volume discounts available under deregulation, some RCS-based VANs resold to small users at higher prices services purchased in bulk from Telenet and Tymnet.
- Also in mid-1983, AT&T Information Systems' Net 1000 became available after a seven-year gestation period. The most recent major delay in the

offering of Net 1000 was regulatory and related to the tariffs for the Bell Packet-Switched Service (BPSS). While reports conflict to a considerable extent on the success of Net 1000, the less than two dozen clients using the service in late 1983 suggest that it has fallen short of the performance needed to justify a \$500 million investment. Despite the slow start, vendors competing in this market should not underestimate the long-term potential of an ATTIS market offering.

- Two major new value-added network offerings were announced in late 1983. These were General Electric Information Services' MARK-NET and Computer Sciences Corporation's (CSC) Infonet Network. These offerings are significant for three reasons:
  - They are consistent with the trend to RCS network "spinoffs."
  - Both networks are very sizable, with the CSC network covering almost 200 U.S. and foreign cities and the GEISCO network covering over 600 domestic locations.
  - Both network offerings are strategically integrated with personal computer usage at corporations. In essence, these networks are part of an unbundling of the components of remote computing services but are intended to be combined with professional services, host- and vendor-supplied mainframes and software, either custom or packaged.
- By offering a "one-stop" approach for a variety of services, including low-speed data communications, these vendors differentiate themselves from the alternative suppliers of data communications services such as Telenet, which supplies only communications. While the integrated sales approach that this implies may be powerful, it also brings with it considerable complications. In the unbundled approach to network sales, the vendor must satisfy the needs of multiple communities, including data processing management, communications management, and the application-oriented requirements of users, plus

company and departmental management. While the revenue stakes are much larger in this approach, it is expected that the sales will also be much more complicated and time consuming. Offsetting this negative to some extent is the likelihood that applications developed this way will remain with the vendor and that growth of communications demand can be better managed. This latter benefit is important for network stability and service levels, a key weakness of VAN vendors in the past.

a. CSC Infonet Network

- The CSC network offers the following:
  - Asynchronous terminals to 1,200 CPS via dial-up.
  - Synchronous terminals at 2,400 and 4,800 CPS via dial-up.
  - Synchronous terminals to 9,600 baud via dedicated lines, with higher speeds upon request.
  - X.25 terminal and host capabilities.
  - Excellent reliability and response times, claimed to exceed 99.7% and average less than 0.3 seconds respectively.
  - Competitive connect and transmission charges at basic rates, along with volume and extended term discounts.
- CSC is emphasizing interconnection with personal computers in its network strategy as well as professional services to integrate PCs with customer data bases and applications.



b. GEISCO MARK-NET

- The GEISCO announcement formalizes and makes public a relatively lengthy and informal experimental period in which GEISCO made its network available to a few customers and also offered an electronic mail service called Quick-Comm. The GEISCO network offering is notable for:
  - An unusually large number of served cities (now over 600 in total), a legacy of GEISCO's "Global Village" strategy of the 1970s.
  - Personal computer communications for TRS-80, Apple II, and the IBM PC with either GEISCO or IBM communications software.
  - IBM 370 host capability.
  - 3270 with foreign host.
  - X.25 host-to-host capability next year.
  - Protocol emulation for ASCII terminals to 3270 applications.
- GEISCO's network strategy appears to emphasize systems integration in which a variety of components, including customer mainframes, personal computers, and GEISCO's mainframes and software, can be configured to meet customer needs. The possible combinations are numerous and include PCs communicating to a GEISCO host containing customer data; a combination of GEISCO and customer hosts communicating to PCs for tasks such as data entry; and a variety of other combinations and permutations. These more complex services also show a wider range of communications offerings, including:
  - 2.4, 2.8, and 9.6 service for IBM 2780/3780 devices, with speeds up through 4.8 available dial-up.

- Dial-out to a port or system.
- Computer-to-computer communications using GEISCO software at speeds to 19.2 baud.
- Based upon its represented capabilities, the GEISCO network offering appears to be quite complete and very much comparable to the capabilities of the traditional value-added network vendors. Additionally, both CSC and GEISCO seek to differentiate themselves by embedding the VAN services in a larger context and broader range of services, extending well beyond "pure" VAN communications.
- MARK-NET's pricing appears to be median for the VAN market for basic asynchronous services. Unusual is the use of a five-level price scheme based on density. Connect time rates range from \$4.20 per hour in 11 metropolitan regions to \$18 per hour at low-density locations, the majority of which are served by FX lines. Character charges for low-speed service are \$0.06 per kilocharacter.
- GEISCO's sales method employs their large existing sales force for RCS and software sales as prospect generators. Once prospects are qualified, a VAN specialist participates in pre-sale, proposal, and post-sale activities and support. GEISCO expects to differentiate its network based on service quality (fewer busies, fewer disconnects), data integrity, and installation and service support.

c. ITT

- In mid-1983 ITT began offering its packet-switched Nationwide Data Communications Service. The cities available in the initial offering were Atlanta, Chicago, Houston, Los Angeles, and New York. The ITT offering is configured as three discrete services.

- The Data Transfer Service for interactive links between terminals, computers, and other networks. Charges for this service are \$9 to \$13 per hour connect, and include transmission charges of \$0.15 to \$0.20 per kilopacket with a packet size of 128 characters.
  - A Data Base Access Service for interactive access to public and corporate data bases. Rates begin at \$3.75 per hour and \$1.25 per kilopacket. Volume discounts reduce this to \$2.60 per hour connect for 5,001 or more hours.
  - Domestic Virtual Lease Service provides point-to-point flat monthly rate connections with alternate routing capabilities. Speeds for this service range between 300 and 4,800 bps. Prices begin at \$900 for the 300 bps link and rise to \$1,200 per month for the 4,800 bps virtual circuit.
- Of the three services, the Virtual Lease is perhaps the most novel. With its distance-independent pricing it is not, however, priced competitively with respect to conventional private-line offerings on most of the possible city pairs in the five-city network. Given the lack of ubiquity and less than attractive pricing, it is unlikely that the ITT offering will have a significant market impact without radical change to the current service offering.

d. Tymnet

- While the emergence of new VAN carriers in 1983 proceeded apace and is expected to continue in 1984, the dominant carriers Tymnet and Telenet also expanded and enhanced their services. At Tymnet there was a substantial number of developments:
  - Tymnet announced a user transparent protocol for personal computer applications. The system has the following features:

- PC-to-PC-to-host communications allowing the establishment of several connections on a single link to other PCs, hosts, and RCS applications simultaneously.
  - End-to-end error detection and correction, including the local-loop portion of the transmission path.
  - Software is resident in the network, thus eliminating from the host the overhead of protocol support.
- A program to verify terminal emulation software for personal computers. As this software is developed (by independent vendors), it will be possible for PCs to access 3270 applications, in addition to currently accessible ASCII applications.
  - Tymnet announced a major expansion program with two parts.
    - Expansion of local dial access to 150 additional cities with populations in excess of 85,000. Total cities serviced now number about 450.
    - Upgrades of existing local-access facilities to increase the number of ports available.
  - Additionally, Tymnet announced upgrades to its Ontyme electronic mail service and limited deployment of a 2,400 bps asynchronous dial-up service.

e. Telenet

- Telenet, while continuing to grow rapidly, has not yet achieved profitability. Perhaps the most significant development in 1983 was the award by the U.S. Department of Agriculture (USDA) of a massive \$160 million contract to provide data communications services to the agency through 1990.



- Telenet continues to "turnkey" private networks as well as provide public network services using its technology. More than 30 dedicated networks have been supplied using Telenet technology.
- Expansion of the network continues apace, often into very small cities when demand exists from current customers.
- In late 1983, Telenet divested its brokerage services operation. Purchased by ADP, this group offered a stock quote service with other information to brokerage "front offices." Revenues were estimated to be about \$35 million.

f. Pricing Trends

- It has been characteristic of the VAN market that much of its revenue growth has resulted from price increases. The October 1983 AT&T tariff filing presages what are very likely to be substantial price increases for VAN services. While AT&T states that the overall price increase for private line services will be 15.3% under the proposed tariff, INPUT believes that the actual increases to VAN suppliers is likely to be somewhat higher. This is because prices for analog private lines increase much more at shorter distances, over 90% at 10 miles, for example. These increases, combined with new charges for maintenance services and trebled installation expenses, plus radical changes in the tariff for Foreign Exchange (FX), lines all suggest that VAN communications expenses will rise substantially in the near future. We anticipate that because of high demand for these services and the AT&T pricing umbrella, the VAN vendors will have no difficulty in recapturing their increased operating expenses through price increases. These price increases will appear in future INPUT market forecasts as an increased market size. The effects on market share are not determinable prior to the price increases themselves. It remains possible, however, that VAN share will grow at a more rapid rate as VANs seize traffic from private lines that will become dis-economic under the new tariffs.



### 3. RECOMMENDATIONS

- In general, vendors have been attracted to the VANs market by its rapid revenue growth and the perceived ease of entry for those firms already having significant investments in networks that deliver processing services. VAN services appear, therefore, to fit naturally into RCS firm strategies. Vendors are cautioned to take the following material differences into account in planning for entries into this market.
  - Differences in nature of sale. Communications sales are most frequently made to DP management or communications management, not to end users, as in the typical RCS sale. This argues for separate selling skills and for individuals who are at home in the DP/communications environment. Sales efforts beyond the opportunistic may require intensive specialized training and perhaps separate sales forces.
  - Because of the interchangeability of VAN services, user loyalty is not as high as in the case of RCS users. Due to the commodity nature of these communications services, it is relatively straightforward to change from one VAN to another, unlike in RCS service.
  - Since VANs have functionally been detariffed, price negotiation has become commonplace among large users. In this regard, VANs are becoming more like RCS services. The much simpler nature of the service offering means that it is much easier to determine real costs.
- INPUT believes that initial, opportunistic sales of VAN services are accomplished relatively easily, particularly when sales arise from the current client base of a vendor. Long-term market participation may prove somewhat more difficult, and the transition between short-term tactics and long-term strategies will be problematic for some vendors and potential vendors.



## APPENDIX A: DEFINITIONS



## APPENDIX A: DEFINITIONS

- INFORMATION SERVICES - The provision of:
  - Data processing functions using vendor computers (processing services).
  - The provision of data base access where computers perform an essential role in the processing or conveyance of data.
  - Services that assist users to perform functions on their own computers (software products and/or professional services).
  - A combination of hardware and software, integrated into a total system (integrated systems).

### A. REVENUE

- All revenue and user expenditures reported are available (i.e., noncaptive) revenue, as defined below.
- NONCAPTIVE INFORMATION SERVICES REVENUE - Revenue received for information services provided within the U.S. from users who are not part of the same parent corporation as the vendor.



- CAPTIVE INFORMATION SERVICES REVENUE - Revenue received from users who are part of the same parent corporation as the vendors.
- OTHER REVENUE - Revenue derived from lines of business other than those defined above.

## B. SERVICE MODES

- PROCESSING SERVICES - Remote computing services, batch services, and processing facilities management.
  - REMOTE COMPUTING SERVICES (RCS) - Provision of data processing to a user by means of terminals at the user's site(s) connected by a data communications network to the vendor's central computer. There are five submodes of RCS:
    - INTERACTIVE (timesharing) - Characterized by the interaction of the user with the system, primarily for problem-solving timesharing but also for data entry and transaction processing: the user is on-line to the program/files.
    - REMOTE BATCH - Where the user hands over control of a job to the vendor's computer, which schedules job execution according to priorities and resource requirements.
    - DATA BASE - Characterized by the retrieval and processing of information from a vendor-provided data base. The data base may be owned by the vendor or a third party.
    - USER SITE HARDWARE SERVICES (USHS) - These offerings provided by RCS vendors place programmable hardware on the user's site (rather than in the EDP center). USHS offers:

- Access to a communications network.
- Access through the network to the RCS vendor's larger computers.
- Significant software as part of the service.

- BATCH SERVICES - This includes data processing performed at vendors' sites of user programs and/or data that are physically transported (as opposed to electronically by telecommunication media) to and/or from those sites. Data entry and data output services, such as key-punching and computer output microfilm processing, are also included. Batch services include those expenditures by users who take their data to a vendor site that has a terminal connected to a remote computer for the actual processing.

- PROCESSING FACILITIES MANAGEMENT (PFM) (Also referred to as "resource management" or "systems management") - The management of all or a major part of a user's data processing functions under a long-term contract (more than one year). This would include both remote computing and batch services. To qualify as PFM, the contractor must directly plan, control, operate, and own the facility provided to the user, either on-site, through communications lines, or in a mixed mode.

- Processing services are further differentiated as follows:

- Function-specific services are the processing of applications that are targeted to specific user departments (e.g., finance, personnel, sales) but cut across industry lines. Most general ledger, accounts receivable, payroll, and personnel applications fall into this category. Function-specific data base services where the vendor supplies the data base and controls access to it (although it may be owned by a third party) are

included in this category. General-purpose tools such as financial planning systems, linear regression packages, and other statistical routines are also included. However, when the application, tool, or data base is designed for specific industry use, then the service is industry specific.

- Industry-specific services provide processing for particular functions or problems unique to an industry or industry group. The software is provided by the vendor either as a complete package or as an applications "tool" that the user employs to produce a unique solution. Specialty applications can be either business or scientific in orientation. Industry-specific data base services, where the vendor supplies the data base and controls access to it (although it may be owned by a third party), are also included under this category. Examples of industry specialty applications are seismic data processing, numerically controlled machine tool software development, and demand deposit accounting.
- Utility services are those where the vendor provides access to a computer and/or communications network with basic software that enables users to develop their own problem solutions or processing systems. These basic tools include terminal-handling software, sorts, language compilers, data base management systems, information retrieval software, scientific library routines, and other systems software.
- SOFTWARE PRODUCTS - This category includes users' purchases of applications and systems packages for use on in-house computer systems. Included are lease and purchase expenditures, as well as fees for work performed by the vendor to implement and maintain the package at the users' sites. Fees for work performed by organizations other than the package vendor are counted in professional services. There are several subcategories of software products.

- APPLICATIONS PRODUCTS - Software that perform as processing to service user functions. They consist of:
  - CROSS-INDUSTRY PRODUCTS - Used in multiple user industry sectors. Examples are payroll, inventory control, and financial planning.
  - INDUSTRY-SPECIFIC PRODUCTS - Used in a specific industry sector such as banking and finance, transportation, or discrete manufacturing. Examples are demand deposit accounting and airline scheduling.
- SYSTEMS PRODUCTS - Software that enables the computer/communications system to perform basic functions. They consist of:
  - SYSTEMS CONTROL PRODUCTS - Function during applications program execution to manage the computer system resource. Examples include operating systems, communication monitors, emulators, and spoolers.
  - DATA CENTER MANAGEMENT PRODUCTS - Used by operations personnel to manage the computer system resources and personnel more effectively. Examples include performance measurement, job accounting, computer operations scheduling, and utilities.
  - APPLICATION DEVELOPMENT PRODUCTS - Used to prepare applications for execution by assisting in designing, programming, testing, and related functions. Examples include languages, sorts, productivity aids, data dictionaries, data base management systems, report writers, project control systems, and retrieval systems.



- PROFESSIONAL SERVICES - Made up of services in the following categories:
  - EDUCATION SERVICES - EDP products and/or services - related to corporations, not individuals.
  - CONSULTING SERVICES - EDP management consulting and feasibility studies, for example.
  - SOFTWARE DEVELOPMENT - Including system design, contract programming, and "body shopping."
  - PROFESSIONAL SERVICES FACILITIES MANAGEMENT (PSFM) - The counterpart to processing facilities management, except that in this case the computers are owned by the client, not the vendor; the vendor provides people to operate and manage the client facility.
- INTEGRATED SYSTEMS (Also known as Turnkey Systems) - An integration of systems and applications software with hardware, packaged as a single entity. The value added by the vendor is primarily in the software. Most CAD/CAM systems and many small business systems are integrated systems. This does not include specialized hardware systems such as word processors, cash registers, and process control systems.
- Integrated systems revenue in this report is divided into two categories.
  - INDUSTRY-SPECIFIC systems, i.e., systems that serve a specific function for a given industry sector such as seismic processing systems, automobile dealer parts inventory, CAD/CAM systems, discrete manufacturing control systems, etc.
  - CROSS-INDUSTRY systems, i.e., systems that provide a specific function that is applicable to a wide range of industry sectors such as financial planning systems, payroll systems, personnel management systems, etc.



- Revenue includes hardware, software, and support functions.

### C. OTHER CONSIDERATIONS

- When questions arise about the proper place to count certain user expenditures, INPUT addresses them from the user viewpoint. Expenditures are then categorized according to what the users perceive they are buying.
- The standard industrial classification (SIC) codes are used to define the economic activity contained in generic sectors such as process manufacturing, insurance, transportation, etc.
- The specific industries (and their SIC codes) included under these generic industry sectors are detailed in Exhibit A.

# EXHIBIT A-1

## INDUSTRY SECTOR DEFINITIONS

INDUSTRY SECTOR	INDUSTRY SIC	INDUSTRY NAME
Discrete Manufacturing	23	Apparel
	25	Furniture
	27	Printing
	31	Leather
	34	Metal
	35	Machinery
	36	Electronics
	37	Transportation
	38	Scientific and Control Instruments
	39	Miscellaneous Manufacturing
Process Manufacturing	10	Metal Mining
	11	Anthracite Mining
	12	Coal Mining
	13	Oil and Gas Extraction
	20	Food Products
	21	Tobacco
	22	Textile Products
	24	Lumber and Wood Products
	26	Paper Products
	28	Chemicals
	29	Petroleum
	30	Rubber and Plastics
	32	Stone, Glass, Clay
	33	Primary Metals

Continued

EXHIBIT A-1 (Cont.)

INDUSTRY SECTOR DEFINITIONS

INDUSTRY SECTOR	INDUSTRY SIC	INDUSTRY NAME
Transportation	40	Railroads
	41	Local Transit
	42	Motor Freight
	43	U.S. Postal Service
	44	Water Transportation
	45	Air
	46	Pipelines
	47	Transportation Services
Utilities	48	Communications
	49	Electric, Gas, and Sanitary
Banking and Finance	60	Banks
	61	Credit Agencies
	62	Security and Commodity Brokers
	67	Holding and Investment Offices
Insurance	63	Insurance (Life, Health, Etc.)
	64	Insurance Agents
Medical	80	Health Services

Continued

EXHIBIT A-1 (Cont.)

INDUSTRY SECTOR DEFINITIONS

INDUSTRY SECTOR	INDUSTRY SIC	INDUSTRY NAME
Education	82	Educational Services
Retail	52	Building Materials, Hardware
	53	General Merchandise
	54	Food
	55	Automotive and Gas Stations
	56	Apparel
	57	Furniture
	58	Eating and Drinking
	59	Miscellaneous Retail
Wholesale	50	Durable Goods
	51	Nondurable Goods
State and Local Government	91-97	As Appropriate
Federal Government	91-97	As Appropriate
Services	73	Business Services (excluding information services companies themselves)

Continued

EXHIBIT A-1 (Cont.)

INDUSTRY SECTOR DEFINITIONS

INDUSTRY SECTOR	INDUSTRY SIC	INDUSTRY NAME
Other Industries	01-09	Agriculture, Forestry, and Fishing
	15-17	Construction
	65	Real Estate
	66	Combinations of Real Estate, Insurance, Loans, Law Offices
	70	Hotels, Rooming Houses, Camps, and Other Lodging Places
	72	Personal Services
	75	Automotive Repair, Services, and Garages
	76	Miscellaneous Repair Services
	78	Motion Pictures
	79	Amusement and Recreation Services, Except Motion Pictures
	83	Social Services
	84	Museums, Art Galleries, Botanical and Zoological Gardens
	86	Membership Organizations
	89	Miscellaneous Services





## APPENDIX B: DATA BASE



EXHIBIT B - 1  
TOTAL INFORMATION SERVICES  
CROSS INDUSTRY APPLICATION MARKET FORECAST  
BY DELIVERY MODE, 1983 - 1988

DELIVERY MODE	USER EXPENDITURE FORECAST								
	1982 (\$M)	82-83 GROWTH (%)	1983 (\$M)	1984 (\$M)	1985 (\$M)	1986 (\$M)	1987 (\$M)	1988 (\$M)	83-88 AAGR (%)
REMOTE COMPUTING	1985	19	2368	2785	3276	3845	4520	5324	18
BATCH COMPUTING	1246	5	1305	1373	1426	1464	1484	1501	3
APPLICATION SOFTWARE									
MAINFRAME/MINI	1355	30	1760	2225	2789	3478	4265	5170	24
MICRO	287	61	462	716	1071	1557	2205	3111	46
PROFESSIONAL SERVICES	380	20	456	552	673	821	994	1192	21
INTEGRATED SYSTEMS	1238	21	1492	1823	2243	2756	3358	4072	22
TOTAL	6491	21	7843	9474	11478	13920	16827	20370	21

NOTE: SINGLE DIGIT PRECISION FOR PURPOSE OF COMPUTATION ONLY. FOR OTHER USES ROUND TO TEN MILLIONS.  
GROWTH RATES ROUNDED TO 1%.

EXHIBIT B - 2  
PLANNING AND ANALYSIS  
APPLICATION MARKET FORECAST  
BY DELIVERY MODE, 1983 - 1988

DELIVERY MODE	USER EXPENDITURE FORECAST								
	82-83								83-88
	1982 (\$M)	GROWTH (%)	1983 (\$M)	1984 (\$M)	1985 (\$M)	1986 (\$M)	1987 (\$M)	1988 (\$M)	AAGR (%)
REMOTE COMPUTING	333	16	386	444	502	567	639	722	13
BATCH	155	5	163	171	176	181	185	189	3
APPLICATION SOFTWARE									
MINI/MAINFRAME	268	41	378	521	704	943	1241	1601	33
MICRO	102	80	184	312	490	725	1037	1452	51
OTHER	130	22	159	193	234	281	337	401	20
TOTAL	988	28	1269	1642	2106	2698	3440	4366	28

NOTE: SINGLE DIGIT PRECISION FOR PURPOSE OF COMPUTATION ONLY. FOR OTHER USES ROUND TO TEN MILLIONS.  
GROWTH RATES ROUNDED TO 1%.



EXHIBIT B - 3  
ACCOUNTING  
APPLICATION MARKET FORECAST  
BY DELIVERY MODE, 1983 - 1988

DELIVERY MODE	USER EXPENDITURE FORECAST								
									83-88
	1982 (\$M)	82-83 GROWTH (%)	1983 (\$M)	1984 (\$M)	1985 (\$M)	1986 (\$M)	1987 (\$M)	1988 (\$M)	AAGR (%)
REMOTE COMPUTING	215	12	241	265	291	318	346	374	9
BATCH	525	5	551	579	596	602	602	602	2
APPLICATION SOFTWARE									
MINI/MAINFRAME	565	30	735	918	1138	1389	1661	1960	22
MICRO	63	65	104	160	243	363	526	778	50
OTHER	205	19	244	300	375	458	554	664	22
TOTAL	1573	19	1874	2222	2644	3129	3689	4379	18

NOTE: SINGLE DIGIT PRECISION FOR PURPOSE OF COMPUTATION ONLY. FOR OTHER USES ROUND TO TEN MILLIONS.  
GROWTH RATES ROUNDED TO 1%.

EXHIBIT B - 4  
HUMAN RESOURCES  
APPLICATION MARKET FORECAST  
BY DELIVERY MODE, 1983 - 1988

DELIVERY MODE	USER EXPENDITURE FORECAST								
									83-88
	1982 (\$M)	82-83 GROWTH (%)	1983 (\$M)	1984 (\$M)	1985 (\$M)	1986 (\$M)	1987 (\$M)	1988 (\$M)	AAGR (%)
REMOTE COMPUTING	175	14	200	227	257	296	343	394	15
BATCH	440	4	458	480	500	515	520	520	3
APPLICATION SOFTWARE									
MINI/MAINFRAME	275	22	336	413	499	599	701	806	19
MICRO	15	60	24	32	43	56	73	95	32
OTHER	120	20	144	174	211	253	299	349	19
TOTAL	1025	13	1161	1327	1510	1718	1935	2164	13

NOTE: SINGLE DIGIT PRECISION FOR PURPOSE OF COMPUTATION ONLY. FOR OTHER USES ROUND TO TEN MILLIONS.  
GROWTH RATES ROUNDED TO 1%.

EXHIBIT B - 5  
ENGINEERING/SCIENTIFIC  
APPLICATION MARKET FORECAST  
BY DELIVERY MODE, 1983 - 1988

DELIVERY MODE	USER EXPENDITURE FORECAST								
	1982 (\$M)	82-83 GROWTH (%)	1983 (\$M)	1984 (\$M)	1985 (\$M)	1986 (\$M)	1987 (\$M)	1988 (\$M)	83-88 AAGR (%)
REMOTE COMPUTING	458	17	536	627	727	836	953	1086	15
INTEGRATED SYSTEMS	72	26	91	116	147	186	229	274	25
APPLICATION SOFTWARE									
MINI/MAINFRAME	95	25	119	145	178	223	276	342	24
MICRO	12	40	17	24	33	48	68	96	42
OTHER	75	14	86	98	112	128	144	163	14
TOTAL	712	19	848	1010	1198	1421	1670	1962	18

NOTE: SINGLE DIGIT PRECISION FOR PURPOSE OF COMPUTATION ONLY. FOR OTHER USES ROUND TO TEN MILLIONS.  
GROWTH RATES ROUNDED TO 1%.

EXHIBIT B - 6  
EDUCATION AND TRAINING  
APPLICATION MARKET FORECAST  
BY DELIVERY MODE, 1983 - 1988

DELIVERY MODE	USER EXPENDITURE FORECAST								
	1982 (\$M)	82-83 GROWTH (%)	1983 (\$M)	1984 (\$M)	1985 (\$M)	1986 (\$M)	1987 (\$M)	1988 (\$M)	83-88 AAGR (%)
REMOTE COMPUTING	30	26	38	48	60	74	92	113	24
PROFESSIONAL SERVICES	380	20	456	552	673	821	994	1192	21
APPLICATION SOFTWARE									
MINI/MAINFRAME	12	43	17	25	36	52	74	105	44
MICRO	10	50	15	25	41	69	111	178	64
OTHER	25	60	40	60	84	113	147	192	37
TOTAL	457	24	566	709	894	1130	1419	1780	26

NOTE: SINGLE DIGIT PRECISION FOR PURPOSE OF COMPUTATION ONLY. FOR OTHER USES ROUND TO TEN MILLIONS.  
GROWTH RATES ROUNDED TO 1%.

EXHIBIT B - 7  
INFORMATION SERVICES  
CROSS INDUSTRY APPLICATION MARKET FORECAST  
BY APPLICATION, 1983 - 1988

APPLICATION	USER EXPENDITURE FORECAST								
	1982 (\$M)	82-83 GROWTH (%)	1983 (\$M)	1984 (\$M)	1985 (\$M)	1986 (\$M)	1987 (\$M)	1988 (\$M)	83-88 AAGR (%)
PLANNING & ANALYSIS	988	28	1269	1642	2105	2699	3439	4367	28
ACCOUNTING	1573	19	1874	2223	2645	3129	3689	4379	18
HUMAN RESOURCES	1025	13	1161	1327	1510	1718	1935	2164	13
ENGINEERING/SCIENTIFIC	712	19	847	1010	1198	1421	1671	1962	18
EDUCATION & TRAINING	457	24	567	708	893	1129	1420	1780	26
OTHER APPLICATIONS	1120	20	1344	1613	1951	2342	2810	3327	20
TOTAL	5875	20	7062	8523	10302	12438	14964	17979	21

NOTE: SINGLE DIGIT PRECISION FOR PURPOSE OF COMPUTATION ONLY. FOR OTHER USES ROUND TO TEN MILLIONS.  
GROWTH RATES ROUNDED TO 1%.



EXHIBIT B - 8  
REMOTE COMPUTING SERVICES  
CROSS INDUSTRY APPLICATION MARKET FORECAST  
BY APPLICATION, 1983 - 1988

APPLICATION/VEHICLE	USER EXPENDITURE FORECAST								
	1982 (\$M)	82-83 GROWTH (%)	1983 (\$M)	1984 (\$M)	1985 (\$M)	1986 (\$M)	1987 (\$M)	1988 (\$M)	83-88 AAGR (%)
PLANNING AND ANALYSIS	333	16	386	444	502	567	639	722	13
ACCOUNTING	215	12	241	265	291	318	346	374	9
HUMAN RESOURCES	175	14	200	227	257	296	343	394	15
ENGINEERING/SCIENTIFIC	458	17	536	627	727	836	953	1087	15
EDUCATION/TRAINING	30	26	38	48	60	74	92	113	24
OTHER	110	15	127	142	157	175	194	215	11
APPLICATION SUBTOTAL	1321	16	1527	1753	1994	2266	2567	2904	14
VALUE ADDED NETWORKS	165	28	211	270	343	433	545	687	27
ON LINE DATA BASES	499	26	631	762	938	1145	1409	1733	22
UTILITY PROCESSING	1065	9	1161	1263	1374	1494	1619	1746	9
TOOLS/VEHICLES SUBTOTAL	1729	16	2003	2296	2655	3072	3573	4166	16
TOTAL	3050	16	3529	4048	4650	5337	6140	7070	15

NOTE: SINGLE DIGIT PRECISION FOR PURPOSE OF COMPUTATION ONLY. FOR OTHER USES ROUND TO TEN MILLIONS.  
GROWTH RATES ROUNDED TO 1%.

EXHIBIT B - 9  
 BATCH PROCESSING  
 CROSS INDUSTRY APPLICATION MARKET FORECAST  
 BY APPLICATION, 1983 - 1988

APPLICATION/VEHICLE	USER EXPENDITURE FORECAST								
	1982 (\$M)	82-83 GROWTH (%)	1983 (\$M)	1984 (\$M)	1985 (\$M)	1986 (\$M)	1987 (\$M)	1988 (\$M)	83-88 AAGR (%)
PLANNING AND ANALYSIS	155	5	163	171	176	180	184	188	3
ACCOUNTING	525	5	551	579	596	602	602	602	2
HUMAN RESOURCES	440	4	458	480	500	515	520	520	3
OTHER	126	6	134	143	154	167	178	191	7
TOTAL	1246	5	1305	1373	1426	1464	1484	1501	3

NOTE: SINGLE DIGIT PRECISION FOR PURPOSE OF COMPUTATION ONLY. FOR OTHER USES ROUND TO TEN MILLIONS.  
 GROWTH RATES ROUNDED TO 1%.

EXHIBIT B - 10  
APPLICATION SOFTWARE  
CROSS INDUSTRY APPLICATION MARKET FORECAST  
BY APPLICATION, 1983 - 1988

APPLICATION/CPU SIZE	USER EXPENDITURE FORECAST								
									83-88
	1982	82-83	1983	1984	1985	1986	1987	1988	AAGR
	(\$M)	(%)	(\$M)	(\$M)	(\$M)	(\$M)	(\$M)	(\$M)	(%)
MAINFRAME/MINI									
PLANNING AND ANALYSIS	268	41	378	521	704	943	1241	1601	33
ACCOUNTING	565	30	735	918	1138	1389	1661	1960	22
HUMAN RESOURCES	275	22	336	413	499	599	701	806	19
ENGINEERING/SCIENTIFIC	95	25	119	145	178	223	276	342	24
EDUCATION/TRAINING	12	43	17	25	36	52	74	105	44
OTHER	140	26	176	203	233	271	311	355	15
SUBTOTAL	1355	30	1760	2225	2789	3477	4265	5170	24
MICRO									
PLANNING AND ANALYSIS	102	80	184	312	490	725	1037	1452	51
ACCOUNTING	63	65	104	160	243	363	526	778	50
HUMAN RESOURCES	15	60	24	32	43	56	73	95	32
ENGINEERING/SCIENTIFIC	12	40	17	24	33	48	68	96	42
EDUCATION/TRAINING	14	50	21	35	58	94	152	240	63
OTHER	81	38	112	151	201	267	347	451	32
SUBTOTAL	287	61	461	714	1068	1553	2203	3111	46
COMBINED TOTAL									
PLANNING AND ANALYSIS	370	52	561	834	1194	1669	2278	3053	40
ACCOUNTING	628	34	838	1078	1382	1751	2187	2738	27
HUMAN RESOURCES	290	24	360	445	542	655	774	901	20
ENGINEERING/SCIENTIFIC	107	27	136	168	211	271	344	438	26
EDUCATION/TRAINING	26	47	38	60	94	146	226	345	55
OTHER	221	30	288	354	434	538	658	806	23
GRAND TOTAL	1642	35	2221	2939	3857	5030	6468	8281	30
% MAINFRAME/MINI	83		79	76	72	69	66	62	
% MICRO	17		21	24	28	31	34	38	

NOTE: SINGLE DIGIT PRECISION FOR PURPOSE OF COMPUTATION ONLY. FOR OTHER USES ROUND TO TEN MILLIONS.  
GROWTH RATES ROUNDED TO 1%.

EXHIBIT B - 11  
ON-LINE DATA BASE/VALUE ADDED NETWORKS  
TOTAL MARKET FORECAST, 1983 - 1988

VEHICLE/MARKET	USER EXPENDITURE FORECAST								
	1982 (\$M)	82-83 GROWTH (%)	1983 (\$M)	1984 (\$M)	1985 (\$M)	1986 (\$M)	1987 (\$M)	1988 (\$M)	83-88 AAGR (%)
ON-LINE DATA BASES									
CROSS INDUSTRY									
SECURITIES	71	30	92	113	140	175	215	264	23
CREDIT	160	25	200	240	278	315	352	395	15
TEXT/BIBLIOGRAPHY	72	11	80	90	107	128	156	190	19
NEWS	107	27	136	170	219	280	359	456	27
ECONOMIC/OTHER	89	38	123	154	195	252	327	428	28
SUBTOTAL	499	26	631	766	939	1149	1409	1733	22
INDUSTRY SPECIFIC									
SECURITIES	320	15	368	442	552	690	867	1074	24
CREDIT	178	12	200	222	244	269	293	320	10
TEXT/BIBLIOGRAPHY	105	14	120	141	169	208	257	322	22
NEWS	24	42	34	48	66	92	125	168	38
ECONOMIC/OTHER	210	33	279	369	479	618	788	994	29
SUBTOTAL	837	20	1002	1221	1511	1876	2330	2878	24
COMBINED TOTAL									
SECURITIES	391	18	460	554	692	865	1081	1338	24
CREDIT	338	18	400	462	523	583	645	715	12
TEXT/BIBLIOGRAPHY	177	13	200	231	275	335	413	512	21
NEWS	131	30	170	218	285	372	484	624	30
ECONOMIC/OTHER	299	34	402	522	674	870	1115	1422	29
TOTAL	1336	22	1632	1987	2449	3025	3740	4611	23
VALUE ADDED NETWORKS									
CROSS INDUSTRY	165	28	211	270	343	433	545	687	27
INDUSTRY SPECIFIC	30	120	66	107	173	264	389	555	53
SUBTOTAL	195	42	277	377	516	697	934	1242	35
GRAND TOTAL	1531	25	1910	2364	2965	3722	4674	5853	25

NOTE: SINGLE DIGIT PRECISION FOR PURPOSE OF COMPUTATION ONLY. FOR OTHER USES ROUND TO TEN MILLIONS.  
GROWTH RATES ROUNDED TO 1%.





**APPENDIX C: INFORMATION SERVICES VENDOR  
FINANCIAL WATCH**



**INPUT's**

**INFORMATION SERVICES  
VENDOR FINANCIAL WATCH**

**THIRD QUARTER 1983**

**INPUT**

# INFORMATION SERVICES VENDOR FINANCIAL WATCH

## APPENDIX C

### I INTRODUCTION

- The Vendor Financial Watch (VFW) is a quarterly release of up-to-date financial reports of public information services companies. It provides quarterly financials on processing services, professional services, software products, and integrated systems companies, both for comparative purposes (vendor to vendor) and to enable participants in a given sector of the information services market to monitor the overall growth of their sector.
- Each sector of the information services market is analyzed separately, both from a revenue and from a net income standpoint. The growth trends are analyzed in the last three columns of each data sheet in calendar sequence.
- Each information services market sector is also commented on separately, highlighting individual company successes and failures, and the trend in the market sector as a whole. The summary analysis at the back of the VFW report analyzes the comparative trends between sectors and comments on the trend of the Information Services market. This sector is particularly important since it identifies the growth patterns very clearly.
- This quarterly Vendor Financial Watch report is intended as a planning tool for market planning executives and as an information newsletter for company executives. The data contained are extracted from published sources, annual reports, and 10-K reports.

INPUT

## APPENDIX C

### II DATA REPORTED

- Each vendor's revenue and net income is reported on a calendar, quarterly basis and comparisons on performance provided between:
  - 1982 versus 1981 (annual)
  - Rolling four quarters (latest four versus earlier four)
  - Latest six months versus year earlier
- The order of these comparisons is as indicated above, so that any trends in growth are evidenced. The same is true of the overall totals provided by sector which establish the growth trend for the sector. The summary sheet at the back of the report analyzes the quarterly trend of each sector for 1981, 1982, and 1983.
- Fiscal revenue is approximated to calendar revenue as follows:
  - Quarterly revenue reported in February, March, and April is reported as Q1
  - Quarterly revenue reported in May, June, and July is reported as Q2
  - Quarterly revenue reported in August, September, and October is reported as Q3
  - Quarterly revenue reported in November, December, and January is reported as Q4
- Values that are followed by a period (●) are INPUT estimates, pending release of the final results from the vendor. These are included so that the overall totals for each sector may be as complete as possible.

**INPUT**



**PUBLIC PROCESSING  
SERVICES COMPANIES**

**INPUT**

# PUBLIC PROCESSING SERVICES COMPANIES

## APPENDIX C

- The healthy trend of the growth and recovery of the processing services sector continues to be evidenced by the latest quarterly analysis:
  - 1982 revenue grew 13% over 1981 (for the sample);
  - Rolling four quarters revenue comparison shows a 14% growth;
  - Latest six months revenue results grew 15% over the year earlier period;
  - Net income shows a sharp decrease in growth from 14% (1982/1981) to 8% (latest results), heavily impacted by poor results from Anacomp and Tymshare.
- Computer Research is easily the leading vendor in terms of revenue growth, followed by SEI Corporation. The average growth rate, for companies showing growth, is 25%.
- However, 20 of the vendors listed continue to see their revenues contract over year earlier results. For vendors showing a contraction in revenue, the average decrease is -14.5%.
- A number of companies, however, evidence a disturbing trend in revenues and net income, among which are Diatron, Keydata, Genesee, Scientific Computers, and Tymshare.
- The total sample reported (35 companies) represents 31% of the revenues of the overall processing services sector. The total growth can be used by clients as a norm for comparing their company's own growth results.

INPUT

# REVENUES OF PUBLIC PROCESSING SERVICES COMPANIES

## APPENDIX C

### REVENUES OF PUBLIC PROCESSING SERVICES COMPANIES

COMPANY NAME	1981 TOTAL	1982					1983		1982/ 1981	ROLLING 4 QTRS	'83/'82
		Q1	Q2	Q3	Q4	TOTAL	Q1	Q2	%(+/-)		%(+/-)
ADP	612826	178530	173327	170096	182520	704473	195969	196949	15	11	12
ANACOMP	109636	26649	29309	48486	46310	150754	46446	30942	38	57	38
BRADFORD	154714	34065	34669	31079	34801	134614	34459	37005	-13	-4	4
CITZN FIN	7283	1964	1969	1961	2125	8019	2315	2672	10	20	27
COMDATA NTWK	19733	5585	6140	7365	7394	26484	8353	9684	34	48	54
COMPUSERVE	31669	8951	9139	9313	10162	37565	10835	11000	19	19	21
COMPUTER LAN	52726	23424	21631	10274	13656	68985	30720	24344	31	25	22
COMPUTER NET	13758	3402	2961	3722	3637	13722	4163	3756	0	18	24
COMPUTER RES	3464	907	835	866	1279	3887	1368	1541	12	43	67
COMPUTER SER	7141	2137	2052	2137	2173	8499	2404	2332	19	13	13
COMPUTONE	13182	4180	6275	4079	5152	19686	5785	7569	49	28	28
COMSHARE	82216	21741	18508	19268	19404	78921	18728	18936	-4	-6	-6
CYCARE	20026	5587	5322	5939	6668	23516	6281	7020	17	18	22
DYATRON	41510	10618	7312	7729	7522	33181	7321	6948	-20	-26	-20
EDS	486702	126511	137158	143763	155063	562495	168202	184551	16	28	34
ELECTR. TAB	5951	1539	1399	1610	1477	6025	1500	1608	1	3	6
EQUIFAX	409573	103524	109784	108848	114549	436705	119113	121188	7	11	13
GENESEE	1396	318	373	313	278	1282	279	328	-8	-10	-12
INFORMATICS	150327	39114	39845	41665	49543	170167	41491	46383	13	10	11
INSTACOM	12963	3721	3736	3971	3874	15302	4116	5309	18	19	26
KEYDATA	10690	2169	1809	1653	1561	7192	1385	1155	-33	-37	-36
NAT DATA	110922	30584	30200	33721	30165	124670	30362	30063	12	3	-1
NETWK D.P.	1803	493	611	678	488	2270	724	495	26	18	10
NUMERAX	4924	1378	1423	1506	1510	5817	1592	1599	18	11	14
PAYCHEX	12283	4700	5000	5323	5736	20759	6238	6540	69	44	32
PAY-FONE	4523	1130	1120	1102	1264	4616	1144	1133	2	1	1
QUOTRON	88120	27572	29847	31102	32397	120918	34594	36726	37	28	24
SAFEGUARD	128010	34396	33130	34049	35477	137052	38157	39279	7	10	15
SCIENTIF.COM	14250	3374	4152	3216	3596	14338	3103	3435	1	-9	-13
SEI CORP	32667	9619	9273	9756	11089	39737	14999	15648	22	44	62
SHARED MEDIC	131615	37572	39584	42306	46310	165772	48702	51042	26	28	29
SYSTEMATICS	41811	12771	14331	14929	15682	57713	16543	17244	38	31	25
TELECREDIT	54612	15380	14963	14305	15884	60532	16383	15559	11	3	5
TIMESHR RESO	9653	3154	3317	3546	3392	13409	3206	3289	39	15	0
TYMSHARE	289688	85234	78369	68115	65307	297025	78529	72850	3	-5	-7
TOTALS	3172367	871993	878873	887791	937445	3576102	1005509	1016122	13	14	15

ALL FIGURES IN \$ 000'S

35 COMPANIES

INPUT

# NET INCOME OF PUBLIC PROCESSING SERVICES COMPANIES

## APPENDIX C

NET INCOME OF PUBLIC PROCESSING SERVICES COMPANIES										
CO. NAME	1981 TOTAL	1982-----					1983-----		1982/ 1981	'83/'82
		Q1	Q2	Q3	Q4	TOTAL	Q1	Q2	%(+/-)	ROLLING JAN/JUN 4 QTRS %(+/-)
ADP	54057	16650	16356	11805	15398	60209	18707	18798	11	12
ANACOMP	8573	2439	-1436	1919	3208	6130	2440	-11527	-28	-186
BRADFORD	822	-345	440	92	221	408	205	-100	-50	-80
CITZN FIN	2235	436	560	466	318	1780	516	789	-20	10
COMDATA NTWK	4054	1184	1263	1562	1709	5718	1701	2126	41	53
COMPUTER LAN	6151	6956	4917	-2157	-1655	8061	7110	4055	31	-26
COMPUTER NET	397	70	-94	67	52	95	352	-123	-76	-21
COMPUTER RES	192	31	-12	28	198	245	159	201	28	428
COMPUTER SER	783	251	214	214	200	879	265	238	12	-1
COMPUTONE	1290	582	573	381	420	1956	631	409	52	-4
COMSHARE	547	91	-1088	127	248	-622	688	1147	-214	3777
CYCARE	1050	189	191	329	457	1166	286	334	11	31
DYATRON	-3773	684	-1397	-197	176	-734	46	28	-81	-101
EDS	41738	12122	13104	13569	14182	52977	14882	16022	27	25
ELECTR. TAB	336	76	38	89	133	336	117	216	0	157
EQUIFAX	15811	2510	3618	3643	2463	12234	4838	5012	-23	34
INFORMATICS	5120	538	614	1317	2988	5457	766	1162	7	25
INSTACOM	2333	764	639	660	624	2687	687	807	15	10
KEYDATA	64	479	211	2684	48	3422	-74	-333	5247	384
NAT DATA	10134	2698	2782	2906	2247	10633	2783	2914	5	-3
NETWK D.P.	-174	-34	70	95	-86	45	144	-21	-126	-195
NUMERAX	473	162	65	101	53	381	68	64	-19	-32
PAYCHEX	346	180	200	307	372	1059	240	425	206	113
PAY-FONE	484	102	13	9	61	185	40	20	-62	-65
QUOTRON	12485	3602	4065	4269	5099	17035	5451	5530	36	48
SAFEGUARD	8753	2233	1985	2192	2784	9194	2542	2362	5	10
SCIENTIF.COM	1544	356	303	388	422	1469	297	280	-5	-2
SEI CORP	2545	798	970	957	1003	3728	1165	1334	46	39
SHARED MEDIC	16607	4766	5220	5535	5852	21373	6035	6606	29	28
SYSTEMATICS	2429	734	1068	962	1209	3973	1198	1324	64	45
TELECREDIT	2828	1105	1181	1043	1153	4482	838	1150	58	16
TIMESHR RESO	638	254	252	270	254	1030	202	204	61	-4
TYMSHARE	15670	4790	4048	2279	-2308	6809	2988	-915	-44	-82
TOTALS	216542	67453	60933	57911	59503	245800	78313	60538	14	13

ALL FIGURES IN \$ 000'S

33 COMPANIES

INPUT

**PUBLIC PROFESSIONAL  
SERVICES COMPANIES**

**INPUT**



# PUBLIC PROFESSIONAL SERVICES COMPANIES

## APPENDIX C

- The growth trend of the professional services sector continues to show a slow decline this quarter, following earlier results:
  - 1982 revenues grew 15% over 1981 (for the sample);
  - Rolling four quarters revenue comparison shows a 13% growth;
  - Latest six months revenue results for the same company sample shows only a 12% increase over the year earlier revenue;
- Net income growth shows a sharp downward trend:
  - 45% up in 1982 over 1981;
  - 19% up in the rolling four quarters analysis;
  - Only 6% up in the latest six months.
- A number of small- and medium-sized companies show excellent growth patterns:
  - Auxton Computer Enterprises (a multiservice vendor);
  - Computer Horizons (serving multiple industries -- and the best in net income growth);
  - Computer Data Systems (a multiservice vendor).
- While many such vendors show very strong growth, a small number show either a rapid decline (ACT, Rand Information Services) or stagnant growth (Monchik Weber, Planning Research Corporation).
- The total sample is 26 companies or 41% of the industry's total revenue and is therefore a valid sample, usable by clients as the norm for comparing their own company's growth results.

INPUT

# REVENUES OF PUBLIC PROFESSIONAL SERVICES COMPANIES

## APPENDIX C

### REVENUES OF PUBLIC PROFESSIONAL SERVICES COMPANIES

CO. NAME	1981 TOTAL	1982					1983		1982/ 1981	ROLLING 4 QTRS	'83/'82 JAN/JUN
		Q1	Q2	Q3	Q4	TOTAL	Q1	Q2	%(+/-)		%(+/-)
ACT	16787	4960	4913	4136	4346	18355	2740	2665	9	-24	-45
ADV.SYSTEMS	29569	8107	7743	8456	8144	32450	9072	8938	10	11	14
AM. MGT. SYS	65634	17294	16525	17803	18020	69642	18668	18758	6	8	11
ANLYSTS INT.	26030	7043	6920	5948	6126	26037	5829	5990	0	-13	-15
AUXTON COMP	9662	2938	3048	3162	3383	12531	3872	4858	30	38	46
BDM INTERN'L	88200	24270	27127	32525	34385	118307	33593	35214	34	38	34
BRN	62709	17195	19048	19020	20794	76057	21745	23865	21	23	26
C.A.C.I.	74831	25648	29624	27745	28275	111292	28653	29651	49	20	5
CGA COMPUTER	25151	8455	8038	7846	8732	33071	9500	10105	31	17	19
COMP DATA	18983	7068	7942	8510	9643	33103	10559	11822	75	58	50
COMP HORIZ	13271	3862	4165	4366	5356	17749	6463	6976	34	51	67
CSC	624726	180200	164811	166149	172270	683430	191684	174276	9	9	6
COMP TASK GR	37321	10064	9750	9814	10488	40116	11187	13011	7	13	22
CONTINUUM	18921	5670	3338	3675	6649	19332	6984	5306	2	17	36
DATA ARCHTS	12388	3282	3678	3064	2554	12578	4197	6014	2	13	47
DYNAMICS RES	32383	7930	8661	9327	12654	38572	9202	9318	19	17	12
INTERMETRICS	22798	6556	7211	7820	8015	29602	8084	7909	30	21	16
KEANE	16397	4430	4433	4290	4451	17604	4666	4930	7	7	8
LOGICON	77619	23662	21419	25214	27341	97636	29332	28019	26	23	27
MONCHIK WEB.	22025	5888	5388	5489	5486	22251	4801	6206	1	-4	-2
PRC	319602	80359	84834	77992	77553	320738	80752	81831	0	-2	-2
RAND INFO.	14430	4375	3729	3443	4452	15999	2540	3123	11	-18	-30
SCIENCE APPL	235474	64524	69662	76700	80374	290260	76192	80000	23	23	17
SYSCON CORP	61123	16376	17315	18487	19221	71399	18831	20212	17	17	16
SYST.& COMP.	23405	6851	7736	8630	9579	32796	10250	11548	40	49	49
TECHNALYSIS	6217	1727	1619	1577	1816	6739	2225	2058	8	16	28
TOTALS	1955556	548674	547677	561188	590107	2247646	611621	612603	15	13	12

ALL FIGURES IN \$ 000'S

26 COMPANIES

INPUT

# NET INCOME OF PUBLIC PROFESSIONAL SERVICES COMPANIES

## APPENDIX C

### NET INCOME OF PUBLIC PROFESSIONAL SERVICES COMPANIES

CO. NAME	1981 TOTAL	1982					1983		1982/ 1981	ROLLING 4 QTRS	'83/'82 JAN/JUN
		Q1	Q2	Q3	Q4	TOTAL	Q1	Q2	%(+/-)		%(+/-)
ACT	-1550	-80	-22	80	671	649	148	31	-142	-182	-275
ADV. SYSTEMS	2539	831	638	1065	715	3249	1018	1010	28	39	38
AM. MGT. SYS	-2030	300	217	-2494	-276	-2253	349	413	11	39	47
ANLYSTS INT.	734	144	163	-17	-25	265	-169	-178	-64	-145	-213
AUXTON COMP	320	244	248	341	-43	790	335	578	147	103	86
BDM INTERN'L	3201	922	1031	1236	1471	4660	1344	1409	46	45	41
BBN	1308	278	616	669	757	2320	912	954	77	108	109
C.A.C.I.	3117	1013	1719	1645	1436	5813	476	167	86	-15	-76
CGA COMPUTER	2129	-1	599	559	875	2032	637	758	-5	79	133
COMP DATA	1030	319	348	389	612	1668	561	520	62	71	62
COMP HORIZ	346	57	-34	135	299	457	366	450	32	381	3448
CSC	17096	6438	5237	4132	3878	19685	4641	2563	15	-11	-38
COMP TASK GR	1271	355	220	286	283	1144	297	372	-10	-10	16
CONTINUUM	2397	772	-418	-597	852	609	1121	30	-75	-22	225
DATA ARCHTS	803	127	16	-532	-936	-1325	407	192	-265	-245	319
DYNAMICS RES	867	149	197	264	44	654	77	94	-25	-55	-51
INTERMETRICS	675	399	186	255	363	1203	448	41	78	15	-16
KEANE	533	41	44	31	189	305	136	78	-43	21	152
LOGICON	2254	1091	1068	1151	1016	4326	1167	1159	92	23	8
MONCHIK WEB.	1264	564	530	247	298	1639	-254	74	30	-79	-116
PRC	2012	1666	1783	2071	2236	7756	2293	2509	285	29	39
RAND INFO.	571	424	130	92	95	741	-83	53	30	-87	-105
SCIENCE APPL	6559	2452	2745	3336	3660	12193	2855	3100	86	47	15
SYS CON CORP	2411	440	631	759	934	2764	689	789	15	31	38
SYST. & COMP.	2323	833	969	1191	1507	4500	1757	2046	94	102	111
TECHNALYSIS	547	140	157	169	186	652	193	220	19	25	39
TOTALS	52727	19918	19018	16463	21097	76496	21721	19432	45	19	6

ALL FIGURES IN \$ 000'S

26 COMPANIES

LAST UPDATED: 10-06-83

INPUT

# **PUBLIC SOFTWARE PRODUCT COMPANIES**

**INPUT**

# PUBLIC SOFTWARE PRODUCTS COMPANIES

## APPENDIX C

- The high rate of growth of the software products sector has begun to cool as evidenced by the latest results from vendors active in the market.
  - 1982 revenues grew 40% over 1981 (for the sample);
  - Rolling four quarters comparison shows a 36% growth;
  - Latest six month revenue results from the sample vendors show a 36% growth over the year earlier period.
- Net income growth has followed in lock step with revenues:
  - 1982 net grew at an astonishing 47% average over 1981;
  - Rolling four quarters analysis showed this growth slowing to 38%;
  - Last six months has seen a quickening of the slowdown to 31% growth.
- This is still a very strong market in an as yet weak economy and some very solid results from the principal vendors illustrate this:
  - Cullinet Software, with a peerless performance of near 60% growth in revenue and similar results in net income growth;
  - MSA with an increasing growth rate, above 40%, and a dramatic net income growth record;
  - Policy Management with an increasing growth, reaching 40% in the last six months, and net income above 40%.
- Bad performances are rare. Comserv, Mathematica, and Scientific Systems are the only companies showing poor first six months results in 1983.

INPUT



# REVENUES OF PUBLIC SOFTWARE PRODUCTS COMPANIES

## APPENDIX C

### REVENUES OF PUBLIC SOFTWARE PRODUCTS COMPANIES

CO. NAME	1981	1982					1983		1982/	'83/'82	
	TOTAL	Q1	Q2	Q3	Q4	TOTAL	Q1	Q2	1981	ROLLING	JAN/JUN
									%(+/-)	4 QTRS	%(+/-)
ADR	52264	13660	16160	16789	21780	68389	17313	16758	31	23	14
AGS COMPUTER	38773	15230	15737	15194	18865	65026	25016	35536	68	74	96
AMERICAN S/W	7514	3040	2759	5100	4492	15391	3740	4519	105	88	42
BPI SYSTEMS	3589	1349	1212	1147	1774	5482	1943	2270	53	46	65
COMSERV	17667	5445	6224	5320	8086	25075	2986	4528	42	-3	-36
COMPUTER AS.	36936	11437	11845	12612	17469	53363	16222	16162	44	37	39
CULLINET	43382	14609	16137	18040	20905	69691	23471	25798	61	60	60
HQSAN SYST.	5649	3567	4032	3134	4891	15624	5025	4217	177	52	22
INT.SOFT.SYS	10705	3269	3479	4423	5452	16623	4247	4935	55	39	36
MSA	73139	16198	22680	20760	41606	101244	19976	36872	38	43	46
MATHEMATICA	37348	8583	8995	8109	9668	35355	8366	8768	-5	-4	-3
NCA CORP	12086	3281	3172	2870	3486	12809	4054	4132	6	12	27
ON-LINE S/W	12070	4109	3967	5235	5463	18774	5526	5665	56	47	39
PANSOPHIC	33737	9369	8748	10140	12608	40865	11766	10575	21	22	23
POLCY MGMT	32690	9850	10915	10884	12828	44477	13817	15263	36	38	40
SCIENTIFIC S	14852	4111	4669	4010	4704	17494	4597	4029	18	3	-2
SOFTTECH	22451	6651	7666	7182	8445	29944	8775	11097	33	37	39
SOFTWR AG	20741	6451	7153	6382	7201	27187	7604	8857	31	22	21
STERLING S/W	1560	428	542	1699	1115	3784	1154	3116	143	250	340
TOTALS	477153	140637	156092	159030	210838	666597	184444	219981	40	36	36

ALL FIGURES IN \$ 000'S

19 COMPANIES

INPUT

# NET INCOME OF PUBLIC SOFTWARE PRODUCTS COMPANIES

## APPENDIX C

### NET INCOME OF PUBLIC SOFTWARE PRODUCTS COMPANIES

CO. NAME	1981	1982					1983		1982/	'83/'82	
	TOTAL	Q1	Q2	Q3	Q4	TOTAL	Q1	Q2	1981	ROLLING	JAN/JUN
									%(+/-)	4 QTRS	%(+/-)
ADR	3074	428	943	848	2518	4737	1073	-835	54	-2	-83
AGS COMPUTER	1796	600	569	634	681	2484	938	1091	38	48	74
AMERICAN S/W	586	258	327	1292	977	2854	723	933	387	531	183
BPI SYSTEMS	545	374	283	225	448	1330	620	414	144	32	57
COMSERV	2213	544	758	330	920	2552	-2149	191	15	-126	-250
COMPUTER AS.	2663	600	145	760	2840	4345	1740	513	63	112	202
CULLINET	6962	2150	2373	2618	3025	10166	3536	3641	46	53	59
HOSAN SYST.	430	527	939	364	1261	3091	1178	1	619	34	-20
INT.SOFT.SYS	1052	242	109	545	853	1749	154	309	66	28	32
NSA	5487	-994	1213	43	8693	8955	-2301	3225	63	74	322
MATHEMATICA	1424	321	324	-298	454	801	-186	150	-44	-91	-106
NCA CORP	1641	527	-94	19	354	806	238	274	-51	-31	18
ON-LINE S/W	1596	480	576	678	453	2187	728	650	37	23	30
PANSOPHIC	4136	1006	633	1367	2165	5171	1613	2362	25	51	143
POLCY MGMT	4204	1470	1650	1754	1756	6630	2064	2309	58	51	40
SCIENTIFIC S	1665	278	550	424	691	1943	343	113	17	-14	-45
SOFTTECH	1005	368	434	320	424	1546	519	515	54	33	29
SOFTWR AG	1848	413	-470	149	370	462	-253	983	-75	33	-1381
STERLING S/W	192	68	16	582	176	842	192	354	339	583	550
TOTALS	42519	9660	11278	12654	29059	62651	10578	16839	47	38	31

ALL FIGURES IN \$ 000'S

19 COMPANIES

INPUT

**PUBLIC INTEGRATED  
SYSTEMS COMPANIES**

**INPUT**

# PUBLIC INTEGRATED SYSTEMS COMPANIES

## APPENDIX C

- The growth pattern of integrated system revenue in the last six months is in line with that of the last four quarters, year on year, and should be a comfort to integrated systems vendors since the business contraction experienced during the recession appears to be over:
  - 1982 revenue grew 18% over 1981 (for the sample);
  - Rolling four quarters comparison shows a 16% growth;
  - Latest six months also shows a 16% growth over the year earlier period;
- The net income contraction which had begun in 1982 appears to be nearly over with the results of the last six months showing a reduction on 11%.
- Outstanding performances are rare, however:
  - C3 had a 53% growth in the last six months on a substantial revenue base and a 31% growth in net income;
  - Intergraph shows a 61% growth in revenue on an even higher revenue base and nearly 180% growth in the net;
  - ASK Computer had an astonishing 69% growth (but on a small revenue base) and a steady net growth around 50%.
- Overall, the picture is not so brilliant, with companies such as National Data Communications showing sharp reversals and most other companies mid-size increases or losses.
- The sample, though small as yet (14 companies), is fairly representative of the sector.

INPUT

# REVENUES OF PUBLIC INTEGRATED SYSTEMS COMPANIES

## APPENDIX C

### REVENUES OF PUBLIC INTEGRATED SYSTEMS COMPANIES

CO. NAME	1981	1982					1983		1982/	'83/'82	
	TOTAL	Q1	Q2	Q3	Q4	TOTAL	Q1	Q2	1981	ROLLING	JAN/JUN
									%(+/-)	4 QTRS	%(+/-)
ASK	18994	6684	7292	7095	8654	29725	10980	12659	56	58	69
AUTO-TROL	46287	12336	10316	10096	11242	43990	9034	12887	-5	-6	-3
C3	45215	13450	12302	10365	17091	53208	22790	16500	18	33	53
COMP CNSL	50674	13534	15101	15268	19400	63303	9786	19657	25	12	3
COMP DSGN	2011	599	471	121	391	1582	379	437	-21	-42	-24
COMPUTERV	270706	79175	84721	79628	81661	325185	90017	94251	20	12	12
DJMS INC.	3048	1171	1034	1526	1538	5269	1201	1196	73	66	9
GERBER	112710	34579	26544	26484	34579	122186	38299	35402	8	16	21
HBO	37202	12279	12321	13183	14514	52297	15146	16640	41	38	29
INTERGRAPH	91088	30036	32246	34004	54979	151265	45357	54813	66	65	61
NAT D. COM	10243	3161	3260	3488	3933	13842	1853	2200	35	-15	-37
REYNOLDS	217269	56444	55514	56746	55575	224279	66216	64189	3	10	16
TRIAD	79126	22902	18574	24800	24831	91107	22024	17347	15	8	-5
UCC/WYLY	146799	39100	42400	41900	36850	160250	34153	36260	9	-8	-14
TOTALS	1131372	325450	322096	324705	365238	1337489	367235	384438	18	16	16

ALL FIGURES IN \$ 000'S

14 COMPANIES

INPUT



# NET INCOME OF PUBLIC INTEGRATED SYSTEMS COMPANIES

## APPENDIX C

### NET INCOME OF PUBLIC INTEGRATED SYSTEMS COMPANIES

CO. NAME	1981	1982					1983		1982/	'83/'82	
	TOTAL	Q1	Q2	Q3	Q4	TOTAL	Q1	Q2	1981	ROLLING	JAN/JUN
									%(+/-)	4 QTRS	%(+/-)
ASK	2076	766	721	822	841	3150	1087	1155	52	45	51
AUTO-TRGL	-3272	34	-1189	-1492	-4921	-7568	-3263	-1397	131	334	303
C3	7520	2397	2083	1102	2129	7711	3571	2282	3	5	31
COMP CNSL	6301	1190	1673	1247	3329	7439	-2113	2727	18	-23	-79
COMP DSGN	162	11	-7	-364	1	-359	13	10	-322	-495	475
COMPUTERVIS.	35748	9482	8793	6910	7196	32381	7818	7990	-9	-19	-13
DIMIS INC.	-164	-181	-681	-424	-515	-1801	-383	-316	998	46	-19
GERBER	4679	802	907	881	958	3548	1771	2380	-24	88	143
HBO	4508	1811	1580	1804	1887	7082	2227	2366	57	40	35
INTERGRAPH	8268	2494	1436	2742	6332	13004	4430	6544	57	104	179
NAT D. COM	-2571	68	3896	605	130	4699	-1435	-1814	-283	-179	-182
REYNOLDS & R	7440	1704	2294	2181	1816	7995	2564	3586	7	20	54
TRIAD SYSTEM	21383	1067	284	1517	1135	4003	598	1489	-81	-7	54
UCC/WYLY	9733	2023	2397	2025	-14192	-7747	-1300	30	-180	-240	-129
TOTALS	101811	23668	24187	19556	6126	73537	15585	27032	-28	-29	-11

ALL FIGURES IN \$ 000'S

14 COMPANIES

INPUT

# **SUMMARY ANALYSIS**

**INPUT**

# PUBLIC COMPANY PERFORMANCE

## APPENDIX C

- The 94 public companies reported represent 30% of the total industry revenues and can therefore be considered as a meaningful overall sample.
- The comparison of the quarter on quarter growth rates (e.g., 1983 growth in Quarter 1 compared to 1982 growth in Quarter 1 for a given service sector) enables the rate of recovery (or lack thereof) to be clearly identified for each sector.
- The processing services sector appears to have recovered nicely from the slump in Q2 1982 and in the second quarter of 1983 grew at almost twice the rate of the year earlier period. Net income growth parallels the revenue growth.
- Software products had a slow first quarter but now appears to be growing at its usual 40+% rate. Recovery appears assured.
- Professional services has not recovered and has still to regain the performance of the equivalent 1982 period. This is due to the heavy reliance on military contracts that do not follow the trend in the economy.
- Integrated systems, like software products, had a poor first quarter in 1983 but has now recovered its 1982 growth rate in Quarter 2. The slump in net income appears to be over.
- Overall, the industry recovered in 1983 Quarter 2 from an unspectacular Quarter 1 and is now back to a healthy growth in revenue though not yet in net income.

INPUT

# PUBLIC INFORMATION SERVICE COMPANY REVENUE

## 1981/1982/1983

### APPENDIX C

SERVICE -----	Q1 --	Q2 --	Q3 --	Q4 --	PUBLIC ANNUAL TOTAL	SERVICES SECTOR TOTAL	SECTOR AS % OF INDSTRY	PUBLIC AS % OF SECTOR
PROCESSING (35 COS)								
81 REV	769	792	789	823	3172	10290	46	31
82 REV	872	879	888	938	3576	11408	44	31
83 REV	1006	1016						
82/81 %	13	11	13	14	13	1118		
83/82 %	15	16						
SOFTWARE (19 COS)								
81 REV	91	115	117	154	477	4165	19	11
82 REV	141	156	159	211	667	5487	21	12
83 REV	184	220						
82/81 %	55	36	36	37	40	1322		
83/82 %	30	41						
PROFESS. SER. (26 COS)								
81 REV	478	481	480	517	1956	4993	22	39
82 REV	549	540	561	590	2248	5543	21	41
83 REV	612	613						
82/81 %	15	12	17	14	15	550		
83/82 %	11	14						
INTEGRATED SYS (14 COS)								
81 REV	261	272	293	305	1131	2884	13	39
82 REV	326	322	325	365	1338	3481	13	38
83 REV	367	384						
82/81 %	25	18	11	20	18	597		
83/82 %	13	19						
TOTALS								
81 REV	1599	1660	1679	1799	6736	22332	100	30
82 REV	1888	1897	1933	2104	7829	25919	100	30
83 REV	2169	2233						
82/81 %	18	14	15	17	16	16		
83/82 %	15	18						

ALL FIGURES \$MILLIONS

94 COMPANIES

INPUT

# PUBLIC INFORMATION SERVICE COMPANY NET INCOME

1981/1982/1983

## APPENDIX C

SERVICE -----	Q1 --	Q2 --	Q3 --	Q4 --	PUBLIC ANNUAL TOTAL -----
PROCESSING (33 COS)					
81 NET	57281	61353	48459	49449	216542
82 NET	67453	60933	57911	59503	245800
83 NET	78313	60538			
82/81 %	18	-1	20	20	14
83/82 %	16	-1			
SOFTWARE (19 COS)					
81 NET	4421	9104	9689	19305	42519
82 NET	9660	11278	12654	29059	62651
83 NET	10578	16839			
82/81 %	119	24	31	51	47
83/82 %	10	49			
PROFESS. SER. (26 COS)					
81 NET	13356	12071	11296	16004	52727
82 NET	19918	19018	16463	21097	76496
83 NET	21721	19432			
82/81 %	49	58	46	32	45
83/82 %	9	2			
INTEGRATED SYS (14 COS)					
81 NET	19706	33436	24417	24252	101811
82 NET	23668	24187	19556	6126	73537
83 NET	15585	27032			
82/81 %	20	-28	-20	-75	-28
83/82 %	-34	12			
TOTALS					
81 NET	94764	115964	93861	109010	413599
82 NET	120699	115416	106584	115785	458484
83 NET	126197	123841			
82/81 %	27	0	14	6	11
83/82 %	5	7			

ALL FIGURES \$THOUSANDS, 92 COMPANIES

INPUT





## APPENDIX D: RELATED INPUT REPORTS



## APPENDIX D: RELATED INPUT REPORTS

	<u>Year</u>
<b>ANNUAL REPORTS</b>	
● U.S. Information Services Markets, 1983-1988	
Volume I - Industry-Specific Markets	1983
Volume II - Cross-Industry Markets	1983
● U.S. Information Services Markets, 1982-1987	
Volume I - Processing Services and Integrated Systems	1982
Volume II - Software Products and Professional Services	1982
● ISIP 1981 Annual Report	1981
● ISIP 1980 Annual Report	1980
● ISIP 1979 Annual Report	1979
● ISIP 1978 Annual Report	1978
● ISIP 1977 Annual Report	1977
● ISIP 1976 Annual Report	1976
<b>INDUSTRY SURVEYS</b>	
● Seventeenth Annual ADAPSO Survey of the Computer Services Industry - 1983	7/83
● Sixteenth Annual ADAPSO Survey of the Computer Services Industry - 1982	7/82
● Fifteenth Annual ADAPSO Survey of the Computer Services Industry - 1981	7/81

- Fourteenth Annual ADAPSO Survey of the Computer Services Industry - 1980 7/80
- Thirteenth Annual ADAPSO Survey of the Computer Services Industry - 1979 7/79
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- Trends in Processing Services and Integrated Systems Pricing
- Trends in Software Products and Professional Services Pricing
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## **1982 MULTICLIENT STUDIES**

- Opportunities in Financial Planning Systems Markets: 1982-1987 12/82
- Computer Output Services Markets, 1981-1986 3/82

## **1981 MULTICLIENT STUDIES**

- Improving the Productivity of Engineering and Manufacturing Using CAD/CAM 12/81
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- Strategies for Competing in the IBM Compatible Marketplace 2/80
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- Opportunities in Digital Communications Services Market Information: A Study of User Networks and Needs 11/80

## **OTHER INPUT SUBSCRIPTION PROGRAMS**

- Company Analysis and Monitoring Program (CAMP) for the Information Services Industry
- Field Service Programs (FSP)
- Management Planning Program in Information Systems (ISP)
- Residual Value Forecasting Program
- Federal Information Systems and Services Program (FISSP)







